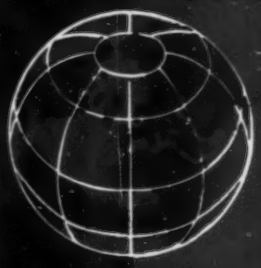
December 1955 VOL. 17, NO. 12

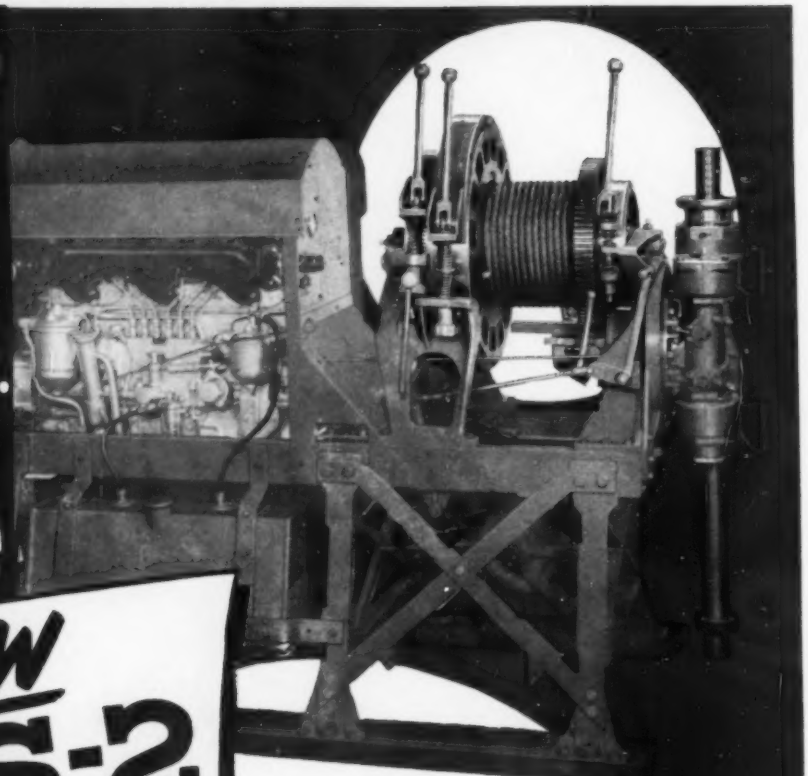
MINING WORLD



Rare Metals' New Plant At Idaho-Almaden
West Rand Sinks Shaft 763 Feet In 30 Days

50 cents a copy—$2.00 in sterling

DOWN to 3500 ft. with the NEW BBS-2 HOIST



NEW BBS-2SR HOIST BOOSTS CAPACITY TO GREATER DEPTHS

This is a "Special Duty" hoist to increase the capacity of the BBS-2 Drill where a travelling block can be used. This combination will enable the drill to handle 3,500 ft. of 'A' rods.

It features a 22" dia x 3" wide brake drum mounted directly on the hoist drum. The self-energizing brake on this drum utilizes ¾" thick heavy duty "block type" brake lining.

The original planetary brake remains unchanged, thus one brake may be used to relieve the other under severe conditions.

The hoist drum itself is 30% wider than the standard heavy duty hoist drum. It will spool 95 ft. of ⅜" cable or 65 ft. of ¾" cable.

The ¾" cable is used for single line hoisting, while the extra capacity for ⅜" cable makes this hoist ideal for double line work.

KITS FOR CONVERSION FROM STANDARD BBS-2 HOISTS AVAILABLE NOW

BOYLES BROS
DRILLING COMPANY LTD.
VANCOUVER, CANADA

Boyles Bros. (Pty) Ltd., Johannesburg, South Africa • Boyles Bros. Drilling Co. Ltd., Newcastle-on-Tyne, England • Atlantic, Gulf and Pacific Co. of Manila, Philippines
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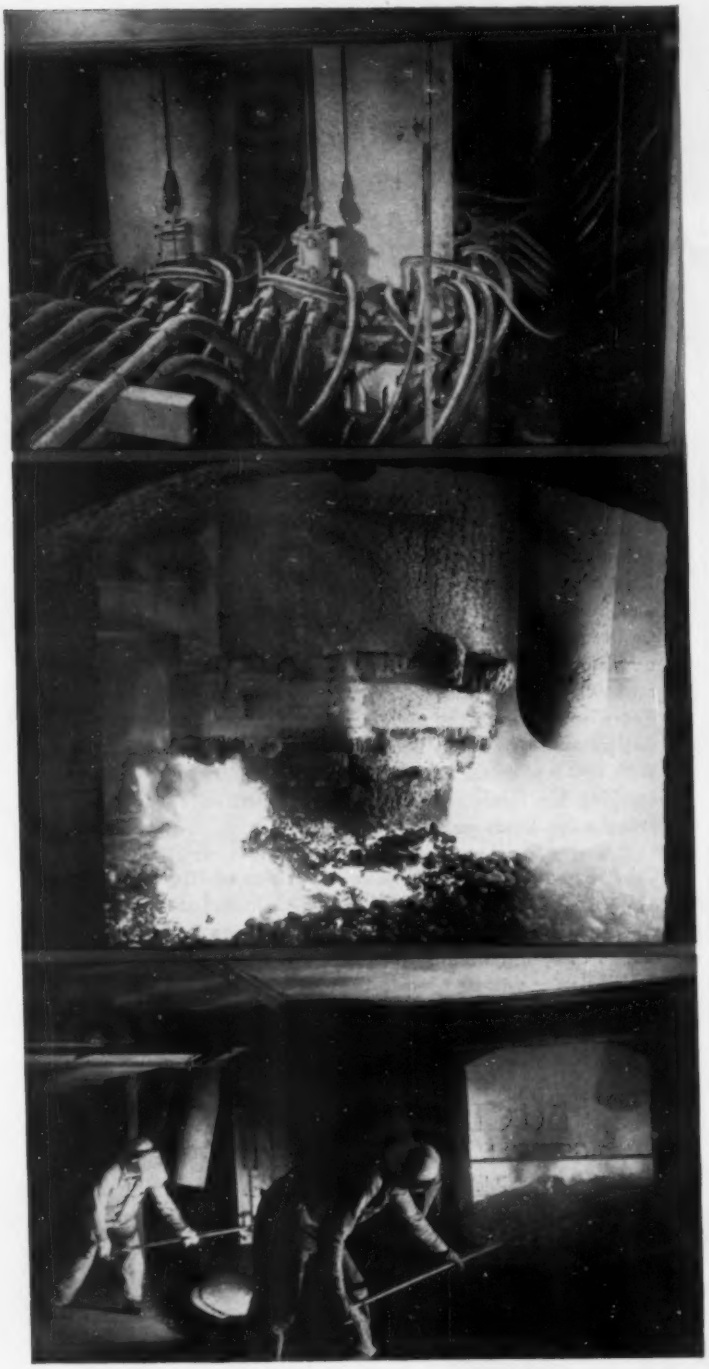
I. H. Hanna, 331 Santa Cruz, San Isidro, Lima, Peru • R.I.E.G.A., Buenos Airies, Argentina • Haehre and Co., A/S., Oslo, Norway
International Machinery Co., Santiago, Chile • Dimitry Scalistiri, Athens, Greece • Thomas M. Nevin Y. Cie., S.A., Mexico, D.F.



98% pure silicon is produced in Dow Corning's new 6000 kva. furnace

SILICON, second most plentiful element on earth, is so tightly combined with oxygen that it can be isolated only through complex chemistry and the terrific heat of the electric furnace. Dow Corning are performing this operation with the Lectromelt* furnace equipment shown here, producing 98% pure silicon metal.

In the furnace reaction, quartzite rock is reduced with coke and charcoal at a temperature of 3100° F. Each tapping of the furnace yields about a ton and a half of silicon. Upon cooling, it is ground to a powder and employed in the manufacture of silicones.

Lectromelt engineers, throughout the past 38 years, have been conducting continuing research on high temperature chemistry. They have designed and built many furnaces for various branches of the metallurgical and chemical industries. For their help, write Electrothermic Division, Pittsburgh Lectromelt Furnace Corporation, 324 32nd Street, Pittsburgh 30, Pennsylvania.

● **TOP:** *This Lectromelt Furnace is unique in design. Its suspended roof protects the flexible conductors and water hoses against the intense heat, but leaves the furnace open for manipulation of the charge.*

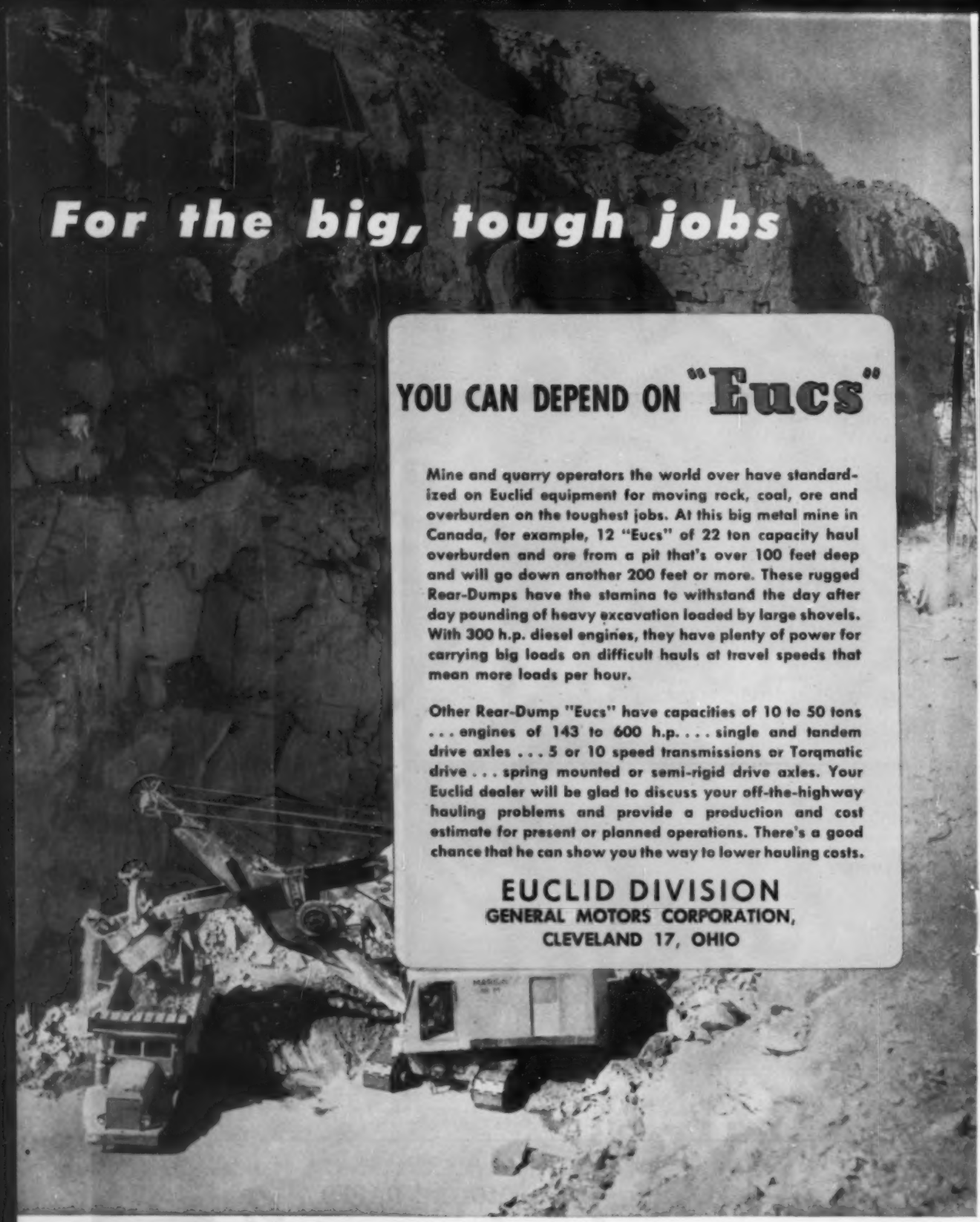
● **MIDDLE:** *3100° F., silicon's reduction temperature, is maintained at each submerged arc, the electrode moving down automatically as it is consumed. At the right is one of six chutes for charging the furnace.*

● **BOTTOM:** *Smelters, working through six open ports at the charging level, regulate, stoke and trim the flaming mixture of quartzite and coke. The crucible is 13 feet across and almost 7 feet deep.*

Manufactured in... GERMANY: Friedrich Kocks GMBH, Dusseldorf... ENGLAND: Birlec, Ltd., Birmingham ... FRANCE: Stein et Roubaix, Paris... BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege... SPAIN: General Electrica Espanola, Bilbao... ITALY: Forni Stein, Genoa... JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF

WHEN YOU MELT... MOORE RAPID *Lectromelt*



YOU CAN DEPEND ON "Eucs"

Mine and quarry operators the world over have standardized on Euclid equipment for moving rock, coal, ore and overburden on the toughest jobs. At this big metal mine in Canada, for example, 12 "Eucs" of 22 ton capacity haul overburden and ore from a pit that's over 100 feet deep and will go down another 200 feet or more. These rugged Rear-Dumps have the stamina to withstand the day after day pounding of heavy excavation loaded by large shovels. With 300 h.p. diesel engines, they have plenty of power for carrying big loads on difficult hauls at travel speeds that mean more loads per hour.

Other Rear-Dump "Eucs" have capacities of 10 to 50 tons . . . engines of 143 to 600 h.p. . . . single and tandem drive axles . . . 5 or 10 speed transmissions or Torqmatic drive . . . spring mounted or semi-rigid drive axles. Your Euclid dealer will be glad to discuss your off-the-highway hauling problems and provide a production and cost estimate for present or planned operations. There's a good chance that he can show you the way to lower hauling costs.

EUCLID DIVISION
GENERAL MOTORS CORPORATION,
CLEVELAND 17, OHIO

EUCLID

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

GM GENERAL MOTORS

Mining World

Including the Export Edition **WORLD MINING**

Published monthly except in April when publication is semi-monthly

VOLUME 17 **DECEMBER 1955** No. 13

The Cover:
Our mobile Christmas tree has something for every one of you. The left side with early day mining equipment heralds MINING WORLD staff's wish for a real old fashioned "Merry Christmas" to each of you. The right side says for a "Happy New Year" use the modern time-and money-saving developments of today.

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mf MILLER FREEMAN PUBLICATIONS

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A PICTURE REPORT OF

INTERNATIONAL POWER *in action!*

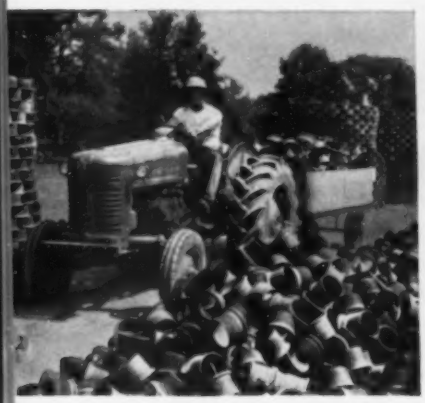
Boosting job production everywhere

"1/3 more overburden daily than competitive crawlers" . . . that's the report from Merkli Brothers Coal Company, Beaver, West Virginia, on their TD-24. Unit is stripping 40 ft. of sandstone and shale to uncover a 12 to 51-inch coal seam. "It has better balance and visibility than other tractors," says Partner Henry L. Merkli. "It costs less to maintain; takes less time to grease, too."

Strips for barite ore—Near Cartersville, Georgia, Paga Mining Company's two TD-24's average a 4,000 ft. stripping cycle every 10 minutes. This includes time to self-load 15 cu. yds. Units are removing 50 ft. of overburden to reach a 15 ft. seam of 9 to 30% barite. They move 2,000 to 2,500 cu. yds. of spoil per 10-hour day. The plant produces 400 tons of barite in the same time, for use in chemical, paint, and oil industries.

Crushes gypsum—Near Avenal, Calif. Superior Gypsum Company's International-powered crusher produces 300 tons of gypsum per 8-hr. day. Material is used to neutralize high-alkali irrigation water.

1 more trip hourly—Fast loading and acceleration help 18½-yd. Pay-scraper make one more trip hourly than other self-propelled scrapers used by W. E. O'Neill Construction Company, Gary, Indiana. Cycle length averaged 2½ miles; material was mostly sand. For hauling ore, scraper interchanges with bottom-dump wagons.



Tows 1500-lb. loads and often 4500 lbs. Utility of IH wheel tractors is now unsurpassed. This unit tows castings for a plant near Longview, Texas . . . others do loader, fork-lift, similar tasks.

No repairs in 2 years of continuous crusher service—that's the record of the International 125 hp diesel shown above. Average output, in gravel pit near Bartlett, N. H., is 100 cu. yds. hourly.

Rugged in rugged rock—"TD-6 is ideal for opening underground mines," says M. McDonald, Kiabob Uranium Corp, Green River, Utah. "It gets around fast in narrow tunnels, yet brings out BIG loads."

Tailings Handling Made Easy

Closeup of 275 ft. dia. Dorr Thickener during final stages of construction. Part of Hydroseparator is visible behind walkway.

7450 TPD of copper tailings can be a big headache without proper disposal facilities. At a new Concentrator in Arizona the proven Dorr Hydroseparator-Thickener team is taking shock loads and variable feed characteristics in stride.

The giant Thickener — 275 ft. in diameter — dominates the picture. But equally important to successful operation is the 30 ft. diameter Dorr Hydroseparator. By scalping out oversize material ahead of the Thickener, the Hydroseparator boosts thickening capacity and cuts water losses in the underflow.

We'd like to tell you more about Dorr-Oliver's ability to provide the correct solution to tailings handling problems. Just drop a note to Dorr-Oliver Incorporated, Stamford, Conn. or in Canada, 26 St. Clair Ave. East, Toronto 5.

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U.S.A.

Rear-Dump hauls heaped load along narrow dike top. Note network of dikes and pumped-out areas behind the machine. Normally, off-shore ore deposits like these are excavated from below the water by floating dredges. These cannot be used here at Bangka because of the great number of huge boulders located on the sea bed.

How Indonesia moves ocean to mine tin

About 300 miles southeast of Singapore, off the Indonesian island of Bangka, lies a network of dikes similar to those in the Netherlands. The purpose of the Indonesian dikes is far different, however, from those in Europe. In the Pacific, dikes are built of sand, stabilized by a mat of thick vines. They form a honeycomb of coffer-dams which enclose large areas of shallow sea water. The water is pumped out, uncovering the sea bottom with its rich tin deposits for mining by conventional dry-land methods. The mining is comparatively easy; the complicated part is constructing the dikes. All material must be hauled along tops of existing dikes which are so narrow and uneven that a vehicle is often in danger of skidding off into the sea.

Rear-Dumps haul 11,100 yds. monthly

Mine officials first tried ordinary trucks to do this hauling. They proved unsuitable. They could not turn on the narrow dike tops and their small tires could not develop enough traction for safety. Then three 9-ton D Tournapull Rear-Dumps were brought in. Their electric controls, positive power steer, big low-pressure tires, and 4-wheel air brakes gave operators perfect safety on the slippery narrow dikes. Shovel-loaded, these LeTourneau-Westinghouse rear-dump units carried 7 cubic yards of sand per trip. They hauled rapidly, and turned easily within a radius of 12 ft. 1 in. When haul was 1½ miles one-way, they moved 11,100 bank yds. of sand per month. All 3 Rear-Dumps worked to great satisfaction despite the difficult job conditions and corrosive sea salt.

Order 16 additional units

Because of Tournapulls' dependability and fast, steady production, the management of the Bangka Tin Mines was able to complete construction of the dikes in time before the monsoon season began. With results like these, the mining management has ordered 16 additional 9 and 18-ton Rear-Dumps for use in open-pit tin mining on the island.

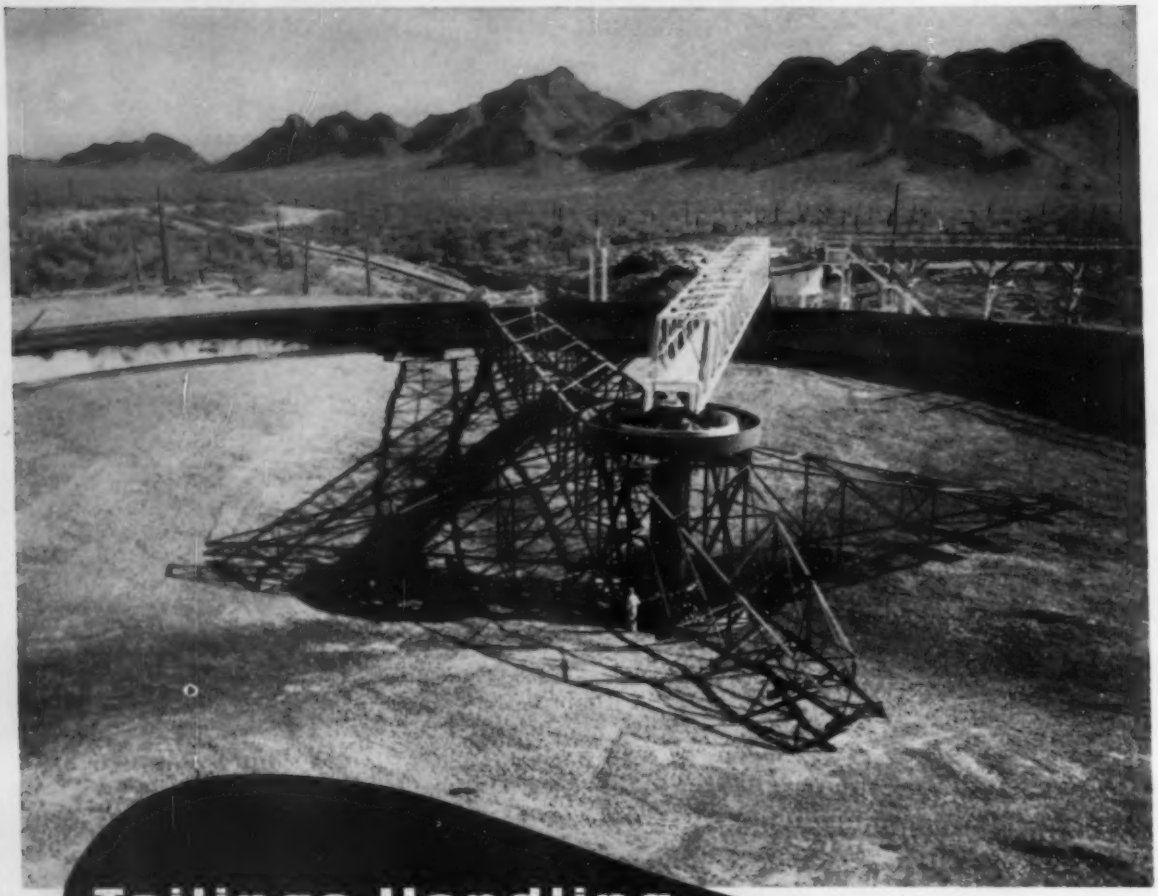
If you too have problems in speeding up on your earthmoving — or in hauling over rough narrow roads — or in reducing maintenance costs, it will pay you to investigate the modern, high-speed Tournapull. There is a size machine to fit your needs — 9, 18, 35, and 50 tons.

Tournapull—Trademark Reg. U.S. Pat. Off. DP-341-M-b

LeTourneau - Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company



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STAMFORD • CONNECTICUT • U.S.A.

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Tournapull—Trademark Reg. U.S. Pat. Off. DR-341-M-b

LeTourneau - Westinghouse Company

PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Blocking out uranium find with truck-mounted drilling rig. Gardner-Denver WH365 compressor feeds air to Gardner-Denver deep hole drills for fast, low-cost drilling.

Prove uranium claims quickly...at low cost ...with GARDNER-DENVER equipment

Whether you're prospecting for uranium . . . developing a good show . . . or producing ore for shipment . . . it will pay to have Gardner-Denver equipment at work. Gardner-Denver air compressors, rock drills, slusher hoists, mine car loaders and auxiliary equipment save time and money for you. Gardner-Denver quality assures trouble-free operation out in the hills where dependability counts. Write today for complete information.

Make your own road in with Gardner-Denver portable and hand held drills — then use them for development work.

GARDNER-DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois
Export Division: 233 Broadway, New York 7, N. Y., U.S.A.

Modern methods speed opening of new coal mine

in Turkey

Since the end of World War II, modernization has reached into many fields of the Turkish economy. New airports and roads have been built, factories erected, and new mines opened. With this stepped-up economy, the search for vitally-needed coal, too, has spread.

One important development is at Kozlu, on the Black Sea. Here, Eregli Coal Fields Exploitation of Zonguldak, is sinking several shafts to reach extended underground bituminous deposits. Perhaps the busiest unit on their project is a 4-wheel rubber-tired Tournatractor with dozer blade.

1 Tournatractor replaces 2 crawler-tractors and 1 grader

With its faster than crawler-tractor speeds, 19 mph instead of 3 to 6 mph, Tournatractor handles many widely-scattered maintenance assignments. Its primary task is maintaining two areas where material excavated from the new mine shafts is dumped. To handle this work, Tournatractor shuttles 6/10 of a mile between the dumps and levels all the muck, rock and shale hauled to the 2 locations by *eight* 22-yd. capacity trucks. This fast rubber-tired tractor also grades 3½ miles of haul road twice a day. In spare time, it cleans spillage from around the mine shafts. Mine officials report that the *one* Tournatractor does the same amount of work on all these tasks as did *two* track-type tractors and *one* motor patrol it replaced.

Tournatractor levels muck at dump area located on the shore of the Black Sea. With big tires and 208 hp, unit has plenty of traction to work in the slick material. When dump has been brought up to level, it will be used as a storage area for mine timber supports.

Leveling present timber storage area, Tournatractor dozes earth and rock. Machine later will spread loose fine earth over the rock to provide a smooth floor.

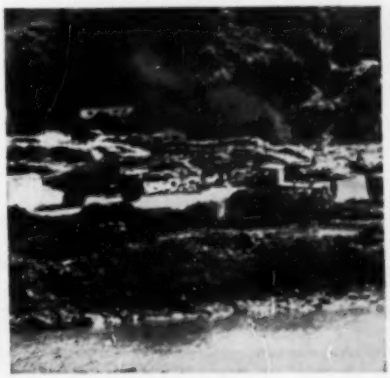
Tournatractor makes cut along base of cliff to build haul road to new dump area. Blade carries 2½ cu. yds. of material per pass. Rig shuttles between jobs at 19 mph.

Tires reduce maintenance costs

Most of this increased efficiency is the result of using tires instead of tracks. Tournatractor can travel at 19 mph as well as work at higher speed than a crawler-tractor. With tires, there is no need for expensive repairs or the time-consuming lubrication necessary with the 400 to 500 parts of an average track assembly.

You can obtain similar efficiencies and lower equipment costs on your mine exploration and development program. Let us help you check Tournatractor savings. Send for output data. There is no obligation.

Tournatractor—Trademark Reg. U.S. Pat. Off. D-326-M-b



LeTourneau-WESTINGHOUSE Company

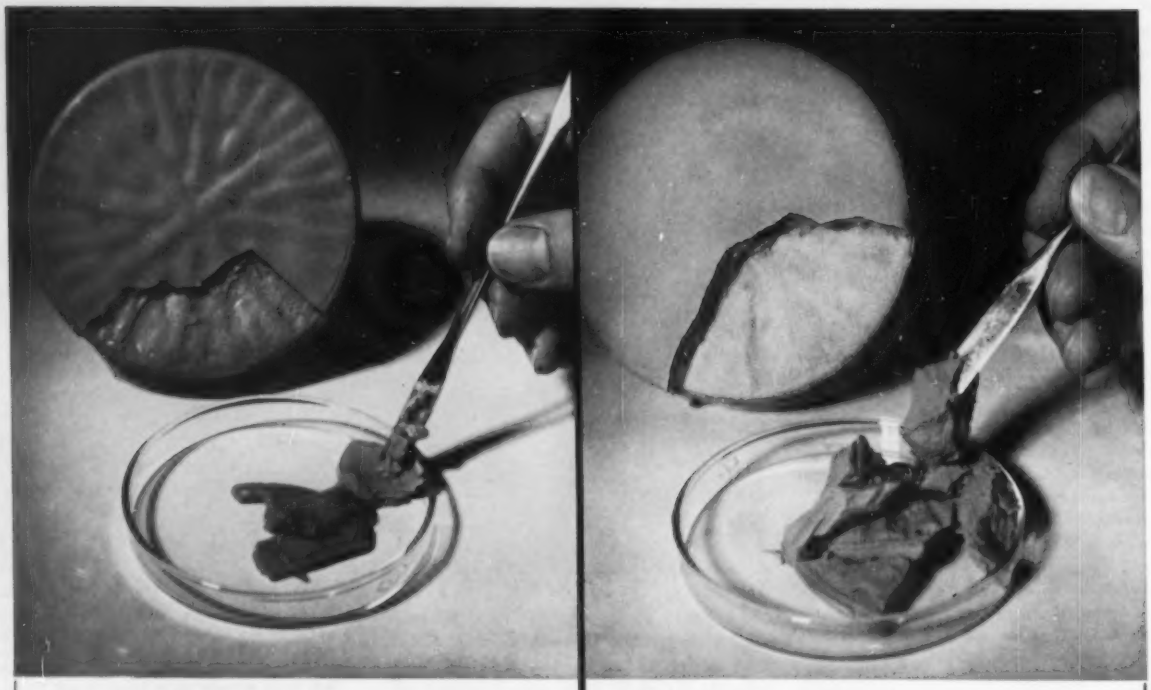
Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

Separan 2610

DOW

GREATLY IMPROVES FILTRATION



Above picture shows thin cake formed on filter with untreated solids. Cycle includes 15-second cake formation and 45-second drying time.

During the same cycle, a much thicker cake is formed by treating with 0.15 lb. of SEPARAN 2610 per ton of dry solids present.

New flocculating agent speeds up filtration and settling rates, brings many other improvements to liquid-solid separations

THE DOW CHEMICAL COMPANY
Dept. TS-789D-3, Midland, Michigan

Please send me information and a trial sample of SEPARAN 2610.

Name_____

Company_____

Address_____

City_____ **State**_____

Prove to yourself the advantages of Separan® 2610 in filtration.

1. Increased cake size
2. Decreased cake moisture and better washability
3. Easy to handle and less dusty cake
4. Less material loss in filtrate
5. Effective over wide pH range

Prove to yourself the advantages of Separan 2610 in settling.

1. Up to 40 times faster settling rate
2. Increased overhead clarity
3. Less materials loss in overhead
4. Reduced cost in acid and alkaline media
5. Increased plant capacity

SEPARAN 2610 is highly effective in these industries:

- Uranium
- Clay
- Borax
- Cement
- Alum
- Potash
- Foundry Sand
- Coal
- Phosphoric Acid
- Iron Ore and Taconite
- Industrial Water, and Waste
- Miscellaneous Metals

®Trademark of The Dow Chemical Company

you can depend on DOW CHEMICALS

DOW

Here's how 6 owners cut costs with Tournapull Rear-Dumps

Huron Portland Cement Company, Detroit, formerly used a narrow-gauge railway system for hauling shale to their mill at Alpena, Michigan. To cut costs and speed the operation, they now have 2 LeTourneau-Westinghouse Model C Rear-Dumps doing the entire job.

2,700 tons daily on 1900′ cycles

In typical operation, a 3-yard shovel loads these Rear-Dumps with 18 tons of shale in 1¾ minutes. Despite adverse grades of 4 to 7% on the haul, each unit takes only 7 minutes to complete 1900′ cycles. The 2 haulers regularly deliver 13 to 14 loads (234 to 252 tons) per 50-minute hour. Company records show an average production per 11-hour shift of 150 loads (2,700 tons). This is enough shale to produce 30,000 barrels of cement daily, greatest output of any mill in the world.

It will pay you to try LeTourneau-Westinghouse Rear-Dumps, too. They are available in 9, 22, 35, and 50-ton capacities to fit your job. Get facts on performance . . . price . . . and delivery. Call us any time.

INDIANA LIMESTONE QUARRY
82,476 tons for 7.6c per ton

Dunn Limestone Co., Spencer, in 6 months hauled 79,923 tons of rock plus 2553 tons of limestone and fluxing stone with 2 "D's". Total costs for 1,932 hours were $7234 ($2760 wages; $3800 depreciation, insurance, taxes; $674 fuel, repairs). That's $3.74 per hour or 7.63c per ton hauled.

200,000-YD. W. VA. TUNNEL JOB
turns where trucks can't

Bates & Rogers Construction Corp., Chicago, teamed 2 D Rear-Dumps and 2 trucks to haul muck and shale for B. & O. railroad tunnel near Clarksburg. While trucks needed skid plate to turn inside 31′ wide tunnel, "D's" made 90° turns (in 12′4″ radius) and easily maneuvered under shovel.

CALIFORNIA MOUNTAIN QUARRY
tried 1... bought 2 "C's"

Monolith Portland Cement Co. tried this one Rear-Dump; liked it so well they bought 2 more for hauling rock from the cramped quarters of their mountain-face limestone quarry. Working at altitude of 3800′, each "C" carries 16 tons per load . . . makes five 400′ cycles every 50-min. hour.

OHIO CLAY QUARRY
moves 100 tons of rock hourly

At U.S. Quarry Tile clay pit, Contractor Adolph Bockus, Canton, hauls 100 tons of overburden hourly with his 122 hp "D" Rear-Dump. Rig carries 9 to 9½ tons per load. Haul speeds average 14 mph over a 700′ haul (which includes grades up to 20%). Output, 11 trips per 50-min. hour.

PENNSYLVANIA COAL MINE
3 "A's" take place of 10 trucks

Colitz Coal Co., Pottsville, uses 3 "A" Rear-Dumps in place of ten 12 to 15-ton trucks. These big rigs carry 40 to 51 tons of overburden per load up 20% grades; over 2000′ cycles, make about 50 trips each per 7½-hr. shift. Says Owner Colitz, "These units have cut operating costs 40%."

Tournapull—Trademark Reg. U.S. Pat. Off. R-601-Q-b

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

Forty Five MOTOR GRADER

120 HORSEPOWER • 23,800 POUNDS

The *Forty Five* is a truly modern heavy-duty motor grader . . . designed for progress and built to *today's* standards of accuracy, dependability, operating ease and low cost. On road construction or maintenance work, you'll see all the advantages of balanced power, weight, traction and proper speeds . . . plus brand new advantages for the operator and mechanic that no other heavy-duty grader offers.

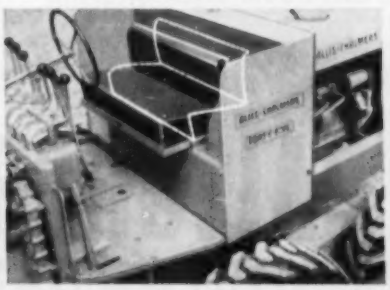
We invite you to check the features shown here. Then for the full story on the *Forty Five* — including extra-big clearances, exclusive ROLL-AWAY* moldboard, single-member tubular frame and fully enclosed power steering —see your nearby Allis-Chalmers dealer.

CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

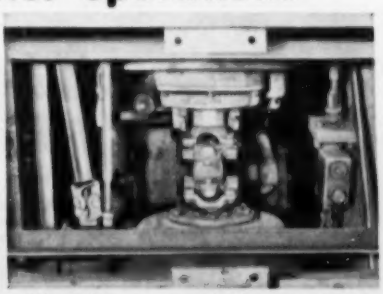
ALLIS-CHALMERS

. . . less maintenance . . . easier and better operation!

New accelerator-decelerator pedal lets the operator increase or decrease engine speed with his foot — without changing his hand throttle setting.

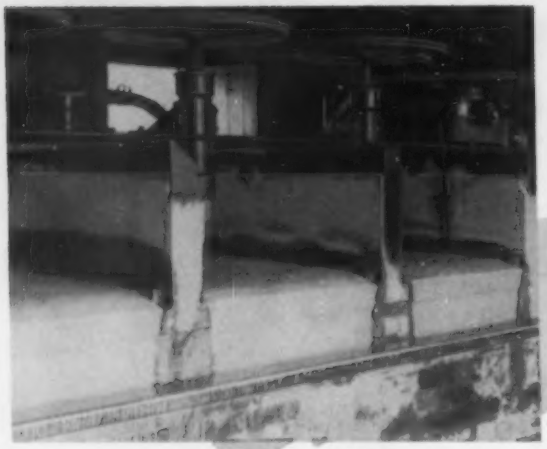


"Box seat" comfort and visibility. Foam-rubber seat adjusts for sit-down or stand-up operation. Flat, roomy platform has tapered corners for top blade visibility.



Matchless servicing accessibility. Unit construction permits easy service or removal of clutch, transmission or engine without disturbing adjacent parts.

AGITAIR® is there!



. . . recovering gold from cyanide tailings in Southern Rhodesia

This unusual flotation circuit in Southern Rhodesia—AGITAIR® cells, with tank assemblies built of brick—is another notable example of AGITAIR® versatility in adapting to local problems. This successful application is the treatment of sand fraction of old cyanide tailings, handling 8,000 tons per month after desliming.

Here, as in many other ore centers throughout the world, AGITAIR® adapts to the local requirements of mill and metallurgy . . . yields maximum recovery at lowest operation cost. AGITAIR® is serving both metallic and non-metallic industries with results that have equalled or exceeded pilot plant findings. Write for information.

Leaders in Experience and Service

GALIGHER PRODUCTS

Commercial and Laboratory AGITAIR®
VACSEAL Pump
Vertical VACSEAL Pump
Acid-Proof Sump Pumps
Laboratory Ball Mills
Geary-Jennings Sampler
Geary Reagent Feeder
Laboratory Pressure Filters

THE GALIGHER CO.

METALLURGICAL DIVISION ENGINEERING SERVICE

CONSULTATION • ORE TESTING
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Home Office: P. O. Box 209 Salt Lake City 10, Utah
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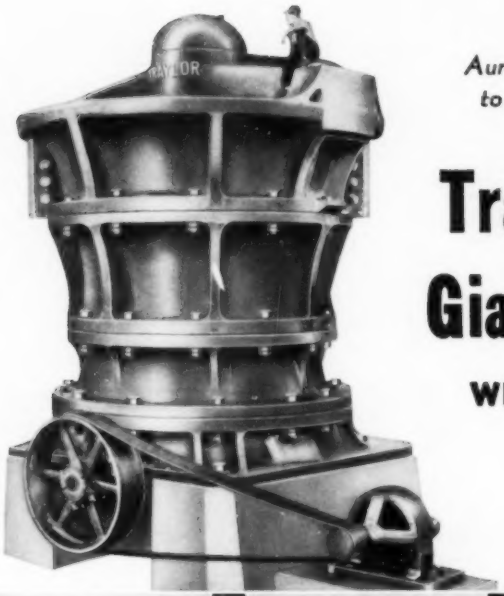
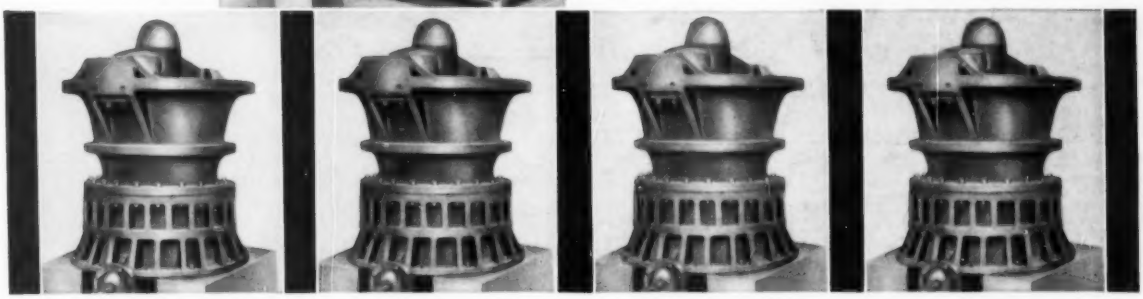


Aurora Taconite Project uses Traylor's Experience to get Economical Production of Taconite Ore

Traylor Now Building Giant Primary Crusher

WITH 60" RECEIVING OPENING AND 120" DIAMETER CRUSHING ROAD



. . . plus four 36 Gyratories for Aurora Taconite Project

Profitable production of iron ore from low-grade Taconite calls for the most modern, efficient methods and equipment. That's why Traylor Gyratories were selected for both primary and secondary reduction of the extremely hard Taconite-bearing rock.

Traylor is now building a huge 60" Gyratory Primary Crusher which is higher than a three-story house and weighs more than a million and a quarter pounds . . . this giant TC Gyratory is the seventh of its kind to be built by Traylor. Chunks of ore the size of a flat-top desk dumped into this crusher at the rate of 4,000 long tons per hour will be reduced to 12". In a 15 hour day, this TC will crush 66,000 long tons of rock.

Four 36" Traylor Gyratories will take the 12" ore from the crusher and reduce it to minus 5" in the secondary reduction operation.

For the past 50 years, leaders in the mining industry throughout the world have turned to Traylor for the most efficient equipment to help them keep pace with advanced mining methods.

* * *

For complete specifications and description of the outstanding features of Traylor TC Gyratory Crushers, send for your copy of Traylor Bulletin No. 126.

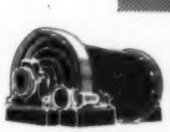
TRAYLOR ENGINEERING & MFG. CO.
1713 MILL ST., ALLENTOWN, PA.
SALES OFFICES: New York • Chicago • San Francisco
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P.Q.

A Traylor leads to greater profits


Primary Gyratory Crushers


Rotary Kilns


Secondary Gyratory Crushers


Ball Mills

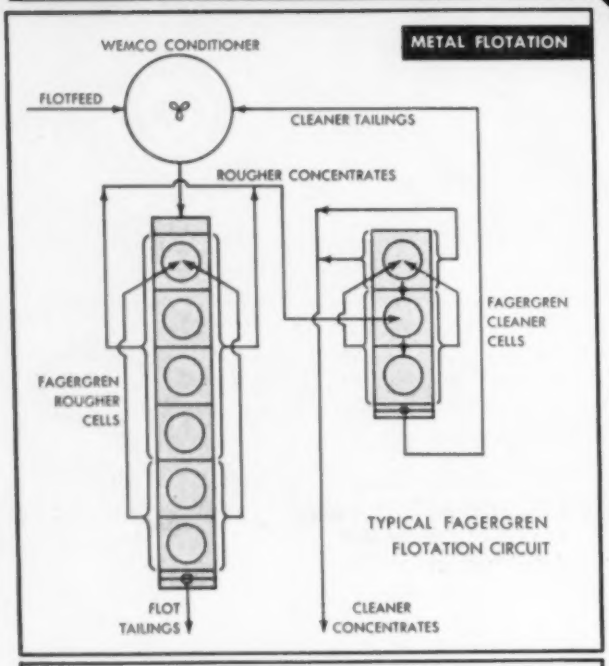

Jaw Crushers

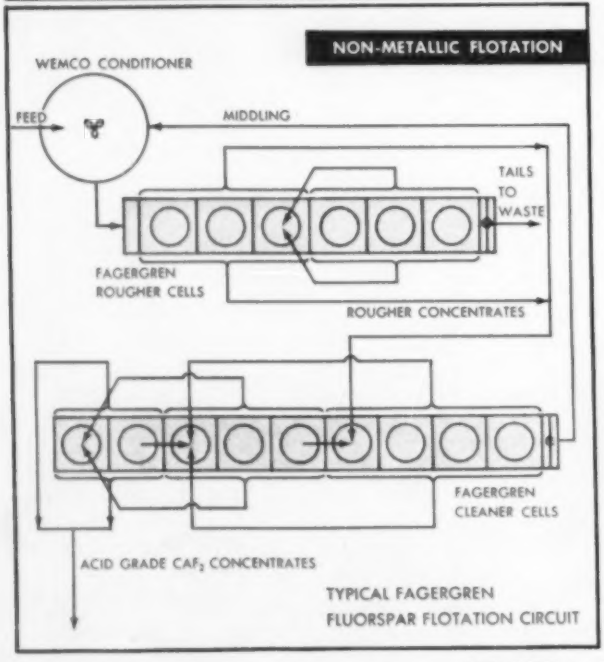

Apron Feeders

FAGERGRENS!

for

FLEXIBILITY OF CELL ARRANGEMENT





The flexibility of cell arrangements provided by Fagergren Flotation Machines is depicted on the accompanying flowsheets. Fagergrens give top performance in medium size and small circuits by the recirculation of flotation products to effect cleaner, recleaner and secondary rougher operations. Cells are arranged for product transfer by:

- ***gravity flow***
- ***on one floor level***
- ***without using auxiliary sand pumping equipment***

Maximum flexibility of cell arrangement is gained while retaining the high metallurgical efficiency provided by the Fagergren rotor-stator principle of pulp aeration and dispersion.

Check these advantages of

FAGERGREN FLEXIBILITY

- *low installation costs*
- *low operating costs*
- *high metallurgical efficiency*
- *large capacity*
- *minimum attendance*
- *minimum maintenance*
- *low reagent cost*

Write today for further information on how to use Fagergren Flexibility to improve your flotation results.

WEMCO
WESTERN MACHINERY COMPANY
760-766 FOLSOM STREET · SAN FRANCISCO 7, CALIFORNIA

OTHER **WEMCO** PRODUCTS
Mobil-Mills • Coal Spirals • HMS Thickeners • HMS Pumps • Sand Pumps Cone Separators • Drum Separators • Fagergren Laboratory Units • Agitators Fagergren & Stelfenson Flotation Machines • Hydroseparators • S-N Classifiers HMS Laboratory Units • Dewatering Spirals • Thickeners • Conditioners • Densifiers

At Anaconda, we know firsthand the enemies of cable life: water, abrasion, excess tension, run-overs—in our own mines. This experience helps us make better cable for *your* mine use.

Get 300% longer service with Anaconda mine-tested cable

Day-in, day-out mine experience helps us make shuttle car cable that really resists enemies of cable life.

Users tell us today's Anaconda flat-twin cable lasts *3 times longer* than the cable they used only a few years ago. What makes this Anaconda cable better?

Its jacket is specially compounded neoprene. You can't tear, cut or abrade it easily. Insulation is a new crush-resistant form of rubber, making this cable tougher and vastly more flame-resistant. And an improved stranding and a brand-new ground wire make it a lot safer to handle.

Your Distributor can give you full facts. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

*Trade Mark

55320

ANACONDA®
MINE CABLE

FLAT-TWIN CABLE

Improved stranding, new insulation, new grounding wire, and neoprene jacket make this a superior cable for shuttle cars, continuous miners, loaders, drill trucks, cutters.

POWER CABLES

AnacondA Types W & G are rugged, sturdy and long-lived. Used for mine power, shovels, continuous miners, loaders, drill trucks, cutters.

SHOVEL AND DRILL CABLES

Securityflex* Types W and G are used with small shovels, self-propelled drill trucks, pumps and a-c mining equipment. For higher voltages, Type SH cables (shielded) are recommended.

SECURITYFLEX CORDS

Unexcelled for strength, wear resistance and long life. Type SO (heavy-duty) provides superior service on remote control and hand drills.

TROLLEY WIRE

FEEDER CABLE BARE OR INSULATED

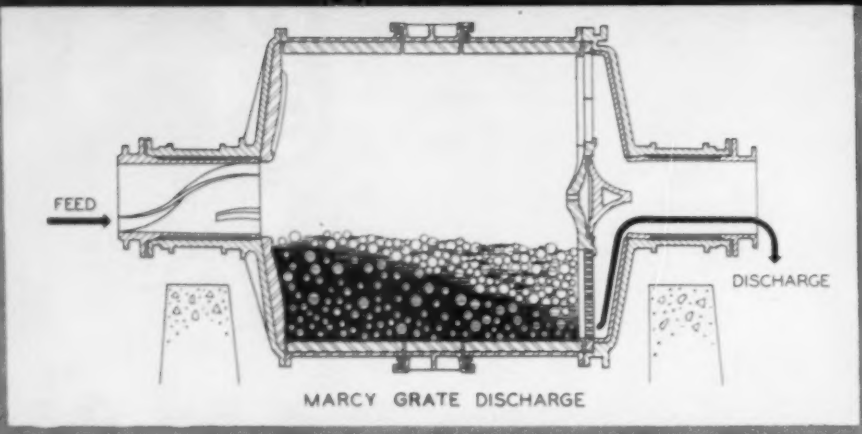
TELEPHONE CABLE

SHOT-FIRE CORD

WELDING CABLE

MARCY Grate Discharge

increases tonnage 25 to 45%
decreases KWH per ton



MARCY GRATE DISCHARGE

"Rapid change of mill content is necessary for high efficiency"... that's the Marcy principle of grinding.

The "rapid change of mill content" is accomplished by use of the Marcy* **full-grate** discharge on ball mills and the **open end** feature on Marcy rod mills. This results in a low pulp line which provides an active, effective grinding mass to act on particle size reduction only . . . there is no wasteful cushioning action by high pulp levels. There is a faster migration of fines than oversize particles, thus less overgrinding. This basic principle of grinding is incorporated in all Marcy Mills and has proved, in hundreds of installations, to give greater output with lower KWH per ton, from 25 to 45% more tonnage compared with the same size overflow mills.

INCREASE IN TONNAGE WITH MARCY GRATES 124% GREATER THAN WITH OTHER GRATES

In seven representative installations where overflow mills were converted to Marcy Grates the average increase in tonnage was 33.6% with a decrease in power of 0.95 KWH per ton. An installation where an overflow mill was converted to grate discharge using another type grate the increase in tonnage was just 15% with a decrease in power of just 0.08 KWH per ton.

WRITE FOR NEW CATALOG NO. 101A

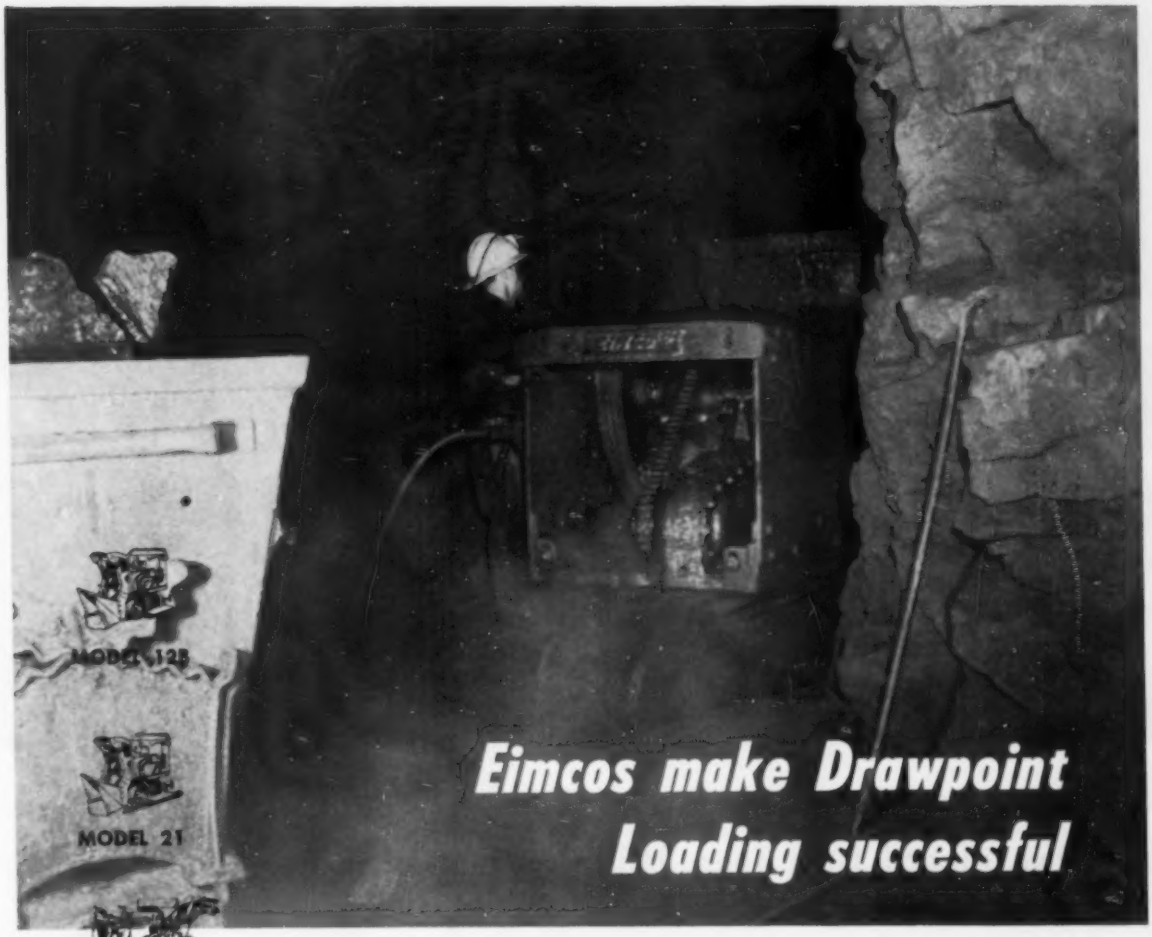
*Marcy is a registered trademark

The Mine & Smelter Supply Co.

DENVER 17, COLORADO

OFFICES IN SALT LAKE CITY, EL PASO, 1775 BROADWAY, N. Y. C.

REPRESENTATIVES IN FOREIGN COUNTRIES



MODEL 40H

MODEL 630

MODEL 105

Most mining companies around the world are now using some type of drawhole loading, or are actively investigating its application for some spot in their operations.

No other method of production loading underground has provided a way to increase man's productivity, to develop an area so quickly or at a comparable low cost, to save time in drilling and money in powder and, to permit men to work with greater safety.

Chutes and grizzlies are too expensive to install, maintain or use in modern day mining.

The Eimco loading machine has helped make this method of production possible. The rugged construction, its ability to work year in and year out with an extremely low cost of less than a cent per ton loaded, make it mandatory that cost cutting with drawpoint loading will include Eimcos for the loading equipment.

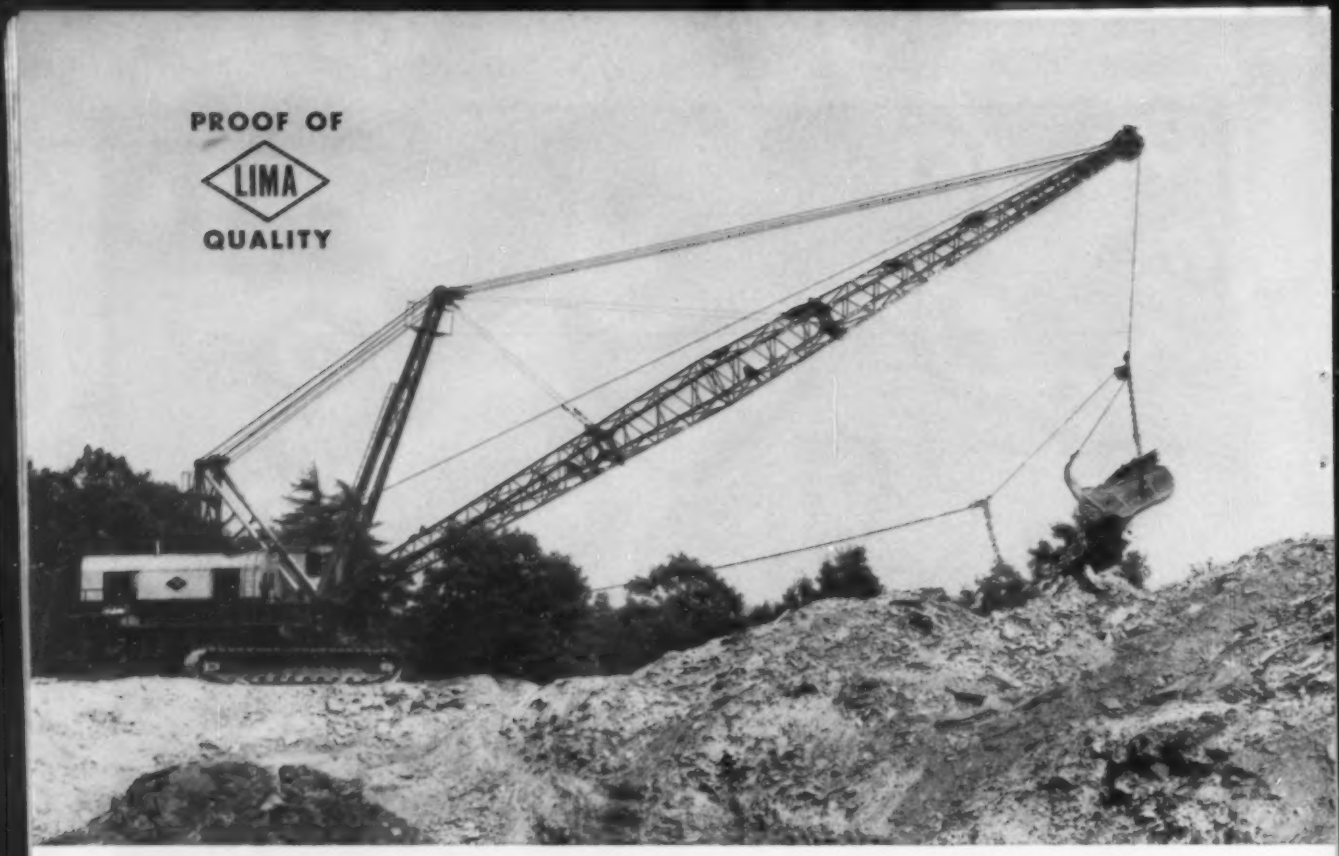
The thousands of Eimcos in use today are being joined by some additional models. Each machine is designed to meet specific requirements so that there is an Eimco loader that will handle your loading job to your complete satisfaction. Eimco will be glad to send you information on loading from drawpoints that has been gathered from mines in many areas. Write for bulletin L1017.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Tex. Birmingham, Ala. Duluth, Minn. Kellogg, Ida. Baltimore, Md. Pittsburgh, Pa. Seattle, Wash. Pasadena, Calif. Houston, Texas Vancouver, B. C. London, England Gateshead, England Paris, France Milan, Italy Johannesburg, South Africa

B-184



BAILEY COAL COMPANY REPORTS . . .

"Our two rugged Lima Type 2400 draglines strip overburden fast!"

Two big, rugged, fast-working Lima Type 2400 draglines pay real dividends in stripping operations for the Bailey Coal Company, Morrisdale, Pennsylvania. Lane Wrye, Job Foreman at Bailey's Gorton strip tells how:

"Our two Lima Type 2400s strip overburden fast! Their big capacity and high-speed operation get us down to the coal level in a hurry . . . whether we have to go through rock, shale or dirt. And these tough, stable machines travel and work anywhere, no matter how rough the footing.

"Our Limas can take the grind of round-the-clock operation, too. We worked our first 2400 through three shifts a day for over four years and the second machine for two years. In that kind of operation the full air controls on the machines are another big help. They let an operator work a full eight-hour shift at top speed and top efficiency."

Mr. Wrye concludes: "We've had excellent performance from our Limas. They've given us high speed stripping for more profitable operation every place we've used them."

Why not take a tip from the experience of Bailey Coal Co.? Equipped as a dragline or shovel, the six yard Lima Type 2400 can speed *your* stripping operations for greater profit. Like every machine in the Lima line, it's designed and built with the emphasis on quality to give you top performance on every job . . . without costly downtime. It will pay you to get complete details on the Type 2400—or other Limas with capacities best suited to your job requirements. Call your nearby Lima distributor today, or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

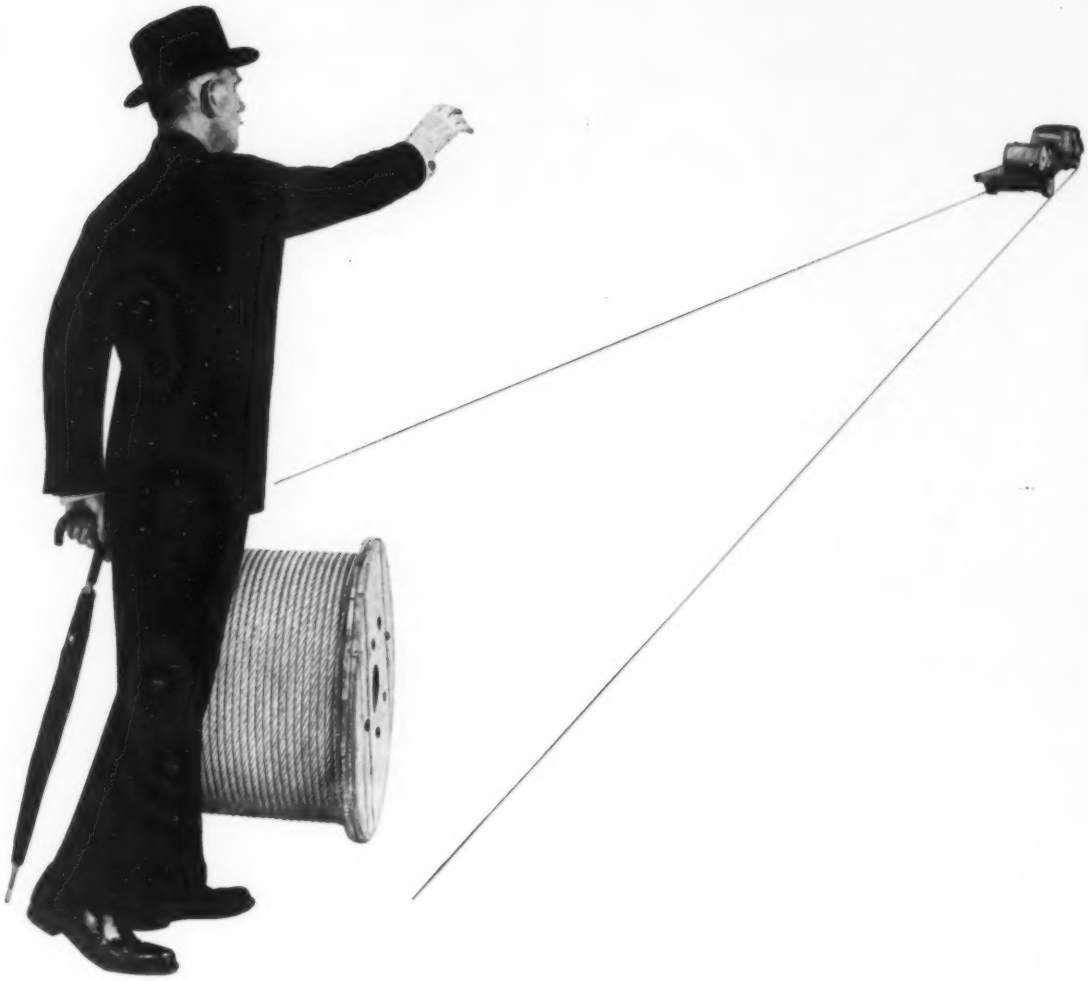
One of Bailey Coal Co.'s Type 2400s, equipped with 110 foot boom, is shown removing shale at Gorton. The extra-wide, extra-long crawlers give the Type 2400 maximum stability.

Cable address: LIMASHOVEL, Lima, Ohio, U.S.A.

LIMA SHOVELS · CRANES · DRAGLINES · PULLSHOVELS

BALDWIN-LIMA-HAMILTON

Construction Equipment Division · LIMA · OHIO · U. S. A.



YOUR WICKWIRE ROPE DISTRIBUTOR SAVES YOU DOWN TIME

When the lack of the proper wire rope halts your production or your operations, thank your lucky stars that your helpful Wickwire distributor is only a quick phone call away. It's a wonderful feeling...to know you'll be getting exactly what you need from his warehouse stocks in only a few hours time.

Now contrast that with the cost in time, money and inconvenience of emergency shipments direct from a distant manufacturer.

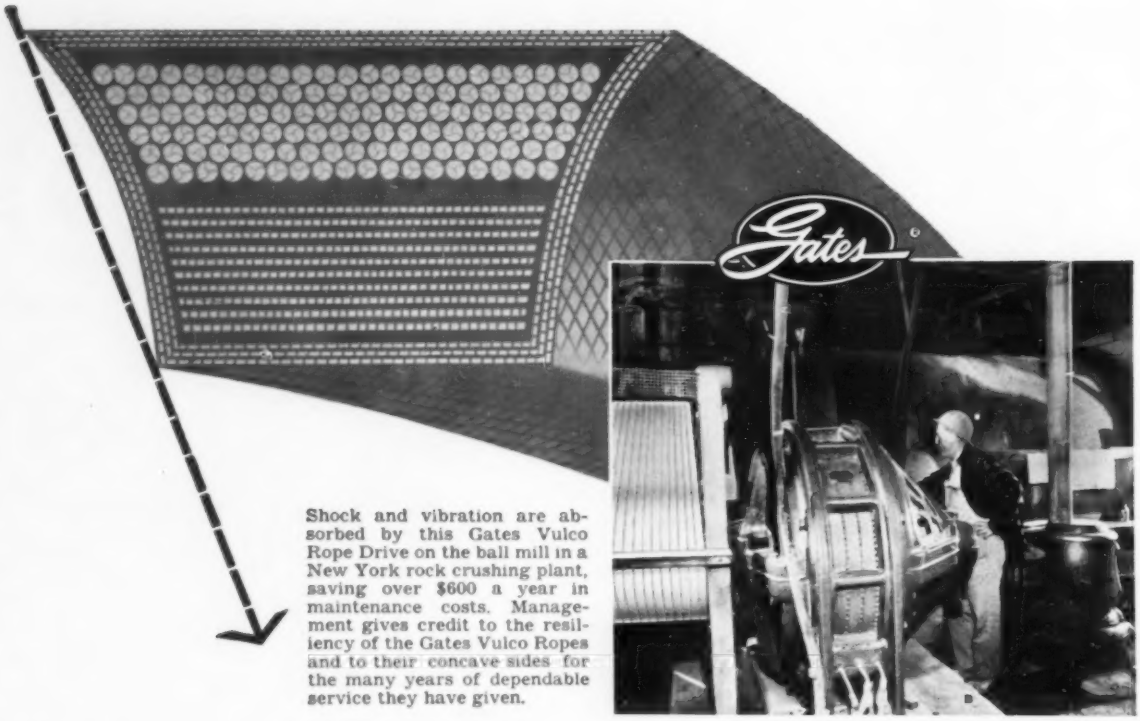
In addition to saving on down time, your Wickwire distributor effects further economies by recommending the wire rope that will give you the longest service life, by minimizing your bookkeeping, inventory maintenance and transportation costs. He keeps your reserve stocks for you so that you don't tie up capital in stand-by materials, warehouse space and unnecessary stock insurance and handling.

Your Wickwire Rope distributor is a good man to know. He's quality people handling quality products. Buy your wire rope and slings from him. You'll find that the many valuable services he offers far outweigh any apparent price advantage you might gain by buying direct.

CF&I WICKWIRE ROPE A CF&I PRODUCT

A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION

3152



Shock and vibration are absorbed by this Gates Vulco Rope Drive on the ball mill in a New York rock crushing plant, saving over $600 a year in maintenance costs. Management gives credit to the resiliency of the Gates Vulco Ropes and to their concave sides for the many years of dependable service they have given.

Concave sides keep belt costs down!

Industry is saving thousands and thousands of dollars every year by specifying Gates Vulco Ropes—the V-Belts with *concave sides* (U.S. Pat. No. 1813698).

Here's the interesting reason *why* Gates belts save money:

On the bend around the sheave the *precisely engineered* concave sides (Fig. 1) of the Gates belt fill out and become straight (Fig. 1-A). Thus the belt makes uniform contact with the sides of the pulley. That means sure pulling power and *even distribution of wear*. Longer wear, fewer replacements cut belt costs...reduce down time...contribute to profits.

Simple test proves value of concave sides

Bend a straight-sided belt (Fig. 2) and feel the sides *bulge out* around the bend. The bulging sides prevent the belt from fitting evenly in the pulley groove (Fig. 2-A). Uneven contact causes uneven wear...shortens belt life...increases costs.

Keep belt costs *down* by specifying Gates Vulco Rope Drives—the V-Belt with *concave sides*. Belts you need are readily available from nearby distributor stocks. The Gates Rubber Company, Denver, Colorado—*World's Largest Maker of V-Belts.*

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

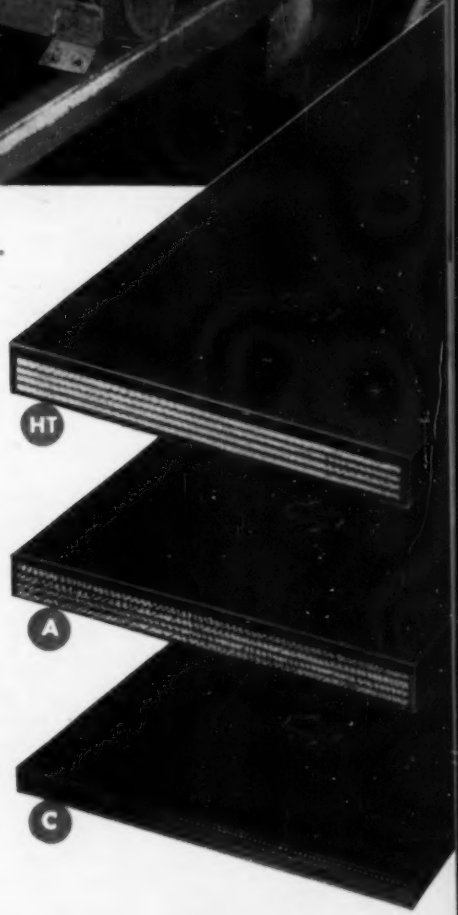
TPA 25-B

GATES VULCO ROPE DRIVES

Thermoid Conveyor Belting cuts handling costs on rugged mining jobs

There's a Thermoid Conveyor Belt designed to lower your handling costs on every mining job. Here are three examples: HT —For extremely abrasive materials such as coal, granite, trap rock, flint rock, quartz ore; A —For slag, lime rock, crushed stone and other highly abrasive materials; C —For moderate abrasives such as sand, loam, soda, gravel.

Thermoid's exclusive impregnation process welds carcass and cover into an exceptionally strong, durable belt. Finest quality reinforcement and specially compounded rubber stocks assure long life . . . lower your handling costs per ton. Your Thermoid Distributor carries a complete line of Thermoid Conveyor Belting, Multi-V Belts and Hose to meet the most severe requirements of any mining operation. Call him or write direct for full information.

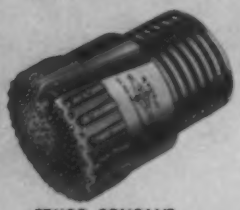


Thermoid Western Co.

Conveyor & Elevator Belting • Transmission Belting • F.H.P. & Multiple V-Belts
Wrapped & Molded Hose • Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Offices and Factories: Nephi, Utah Trenton, N.J.

TRUCO CORING BIT



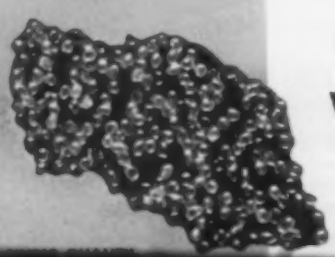
TRUCO CONCAVE BLAST HOLE BIT

TRUCO PILOT BIT

TRUCO IMPREGNATED CORING BIT

TRUCO REAMING SHELLS

TRUCO STANDARD OIL FIELD BIT



A Mountain of Light, and a Star

When the royal crown is placed upon a British monarch's head, the soft lights of Westminster Abbey dance upon some of the most beautiful jewels in existence, including two of the world's greatest diamonds—the Koh-i-noor and the Great Star of Africa.

The Koh-i-noor, or "Mountain of Light," was found four thousand years ago in the legendary diamond fields of the King of Golconda. War, conquest, torture, theft, assassination and barter brought it to princes, moguls, shahs and rajahs, and brought tragedy, too, so the legend says, except when it was worn by a woman. Originally it weighed 800 carats, but cutting has reduced it to 106½ and greatly increased its beauty. It adorns the front of the Queen's crown.

The Great Star of Africa, set into the top of the royal scepter, weighs 516½ carats and is the largest cut diamond in the world. The original stone weighed 3,025 carats (about a pound and a half) and although it was the largest diamond ever found, was, obviously, but part of a much larger stone, still undiscovered.

The Great Star came from Premier Mine No. 2 in South Africa which produces many of the fine diamonds used in Truco Diamond Bits. Positioned with "cutting edge to the work," these diamonds give Truco Diamond Bits their irresistible cutting power; their ability to penetrate any formation, swiftly, accurately, thriftily, dependably, lowering rig time and cutting footage costs. May we send you the Truco Diamond Bit Catalog?

TRUCO DIAMOND BITS

by

WHEEL TRUEING TOOL COMPANY

3200 W. Davison Avenue, Detroit 38, Michigan

WHEEL TRUEING TOOL CO. OF CANADA, LTD.
575 Langlois Avenue, Windsor, Ont., Canada

Bolt Your Roof

GREATER SAFETY • LOWER COST • FASTER LOADING
BETTER VENTILATION • WIDER CLEARANCES

It all adds up to bigger tonnage

Reducing roof falls is the big reason for using mine roof bolts. Overlying rock is anchored by the bolts, consolidating the formations into a self-supporting mass.

But roof bolts have many other advantages that add up to bigger tonnage. When you replace bulky supports with roof bolts, you gain a lot of extra space that speeds loading and makes it easier to maneuver mechanical equipment. Ventilation is better. Best of all, tonnage goes up and costs go down.

Bethlehem Pacific offers two types of roof bolts. The best type for your mine depends on the type of rock at each level. A Bethlehem Pacific engineer will be glad to consult with you. Just phone or write our nearest sales office.

SLOTTED ROOF BOLT—One end has a slot to accommodate wedge. Other end has 5 in. of 1-in. diam rolled threads. When driven against the back of a 1¼-in. hole, the wedge is forced deep into the slot, expanding the bolt ends so that tremendous pressure is exerted against the sides of hole. American Standard Heavy Hexagon nut is tightened to hold roof plate against the roof.

SQUARE-HEAD ROOF BOLT—The Type C expansion shell fits on the end of a special unchamfered square-head, rolled-thread ¾-in. bolt. When the bolt is inserted in the hole and tightened, the tapered steel plug expands the four leaves of the malleable-iron shell and forces them against the sides of the hole.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

Sales Offices: Los Angeles, Phoenix, San Francisco, Portland, Seattle, Spokane

BETHLEHEM PACIFIC

BETHLEHEM STEEL

Here's Where AMSCO®

"Wear-Sharp" Repointers

INCREASED DIGGING LIFE 8 TIMES

On a particularly rugged digging operation, Amsco manganese steel "Wear-Sharp" repointers increased the dipper's active service period by 8 times . . . operating an average of 32 days without repointing, as against 4 days for the type previously used.

Extend repointer or dipper tooth life on your dippers with Amsco "Wear-Sharp" repointers. When you fill their end grooves with Amsco hardfacing rod, you protect the tooth at the 6 points of maximum wear. This prevents corner blunting and equalizes wear along the entire cutting edge so that the tooth *stays sharp.*

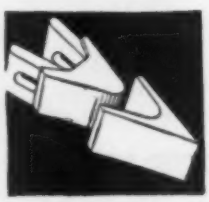
Order Amsco repointers from your Amsco distributor. He carries a complete line of Amsco manganese steel dipper teeth, shapes and hardfacing materials.

Besides manganese steel, Amsco makes other alloy steels with high resistance to impact and abrasion.

FACTS ABOUT 3 TYPES OF AMSCO REPOINTERS

"Wear-Sharp" Repointer (patented)—To equalize wear and maintain a sharp cutting edge, grooves on each end and on corner faces can be filled with a tough hardfacing deposit. It prevents the tooth from rounding or blunting. Teeth stay sharp, helping to maintain digging speed and to conserve power. Available straight (shown) or with crescent-shaped backs.

Repointer Bars—Excellent for rebuilding teeth used in heavy digging, these repointers are made of tough, wear-resistant manganese steel. They are delivered in bars of 3-foot length and cut to the width of the tooth on the job. They are also being used for rebuilding lips on dippers, clamshell buckets, ore loaders and dragline buckets.



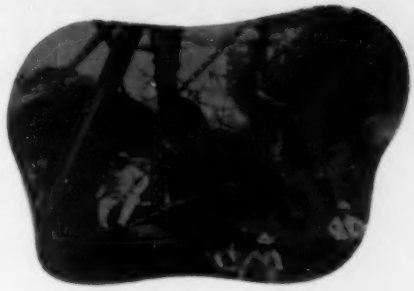
Cast-to-Shape Repointers—Ideal for less severe digging, these manganese steel repointers are easy to weld on. An average-size tooth can be completely rebuilt in about 15 minutes, using only two electrodes. Cast with "ears" that protect the flat sides of the tooth, these repointers add strength and service life to the entire tooth.

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Ill.

75 YEARS OF BUCYRUS-ERIE LEADERSHIP . . .

December 18 marks Bucyrus-Erie's 75th Anniversary. In the years since 1880, the company has been proud to bring many significant advancements to the design of excavators . . . the first electric and the first diesel excavators . . . the first crawler-mounted dragline . . . the first heavy-duty, full-revolving quarry and mine shovel . . . and too many more "firsts" to detail here. Most important, however, the know-how back of these is yours in whatever Bucyrus-Erie machine you use.



President Theodore Roosevelt Visits Panama Canal: This Bucyrus-Erie shovel, one of 77 used on the Big Ditch, was included in his 1908 inspection tour.

Removing overburden from iron ore is this heavy-duty 6-cu. yd. mining shovel. Bucyrus-Erie also offers large revolving excavators and walking draglines for deep stripping use.

. . . GIVES YOU TOP PERFORMANCE TODAY . . .

You can expect top performance from a Bucyrus-Erie excavator because it's *built right in* — from the ground up. Bucyrus-Erie has pioneered the use of Ward Leonard control which gives the operator smooth, efficient control over all operating functions. Front end provides strength to withstand shock loads of digging, yet is remarkably light in weight to hold down swing inertia. Main machinery is simple and strong for most efficient operation and long service life. The extras Bucyrus-Erie puts into the design and construction of excavators pay off many times over in added output and lower cost operation.

. . . PROMISES EVEN BETTER EXCAVATORS TOMORROW

You can expect even higher performance standards from Bucyrus-Erie excavators in years to come. The development of new and improved designs, and the search for better materials and more efficient manufacturing methods never ends. With facilities unsurpassed in the industry, Bucyrus-Erie promises you excavators that will serve you better than ever. 23Y55C

1880 BUCYRUS ERIE *1955*

South Milwaukee, Wis.

75 Years of Service to Men Who Shape the Earth

GISMO METHOD SETS NEW

New Production Records and Drastic Cuts in Man-hour Costs Foreseen!

COULD THIS BE THE BEGINNING of the "Gismo Age" in rock mining? One mine operator has said: "The Gismo is going to revolutionize rock excavation methods in much the same manner that large tractor drawn earth moving scrapers have revolutionized the earth moving procedure."

One new mine being mechanized by the Gismo Method plans to produce 2,000 tons per day at an overall cost of less than $1.00 per ton. Production of ore is expected to be approximately 50 tons per man when the mine is operated on a 2,000 ton per day basis and 57 tons per man when operated on a 4,000 ton basis. The devisor in this case is all of the men to be employed, surface and underground, for production, including supervisors and general foreman.

An older mine, changing over to the Gismo Method, has increased tonnage per man-shift almost 10 times in the stoping operations. Compared to the conventional method used in 1950, the Gismo Method has halved both development and labor costs.

What is this equipment? The Gismo itself is a general purpose utility self-loading transport that is simple, versatile and built to take the punishment of rock excavation. No special development facilities or conditions are usually required. It operates in sloping ore bodies with irregular outlines, as well as large or relatively small openings. With perhaps a few exceptions, the Gismo can be taken into any mine —disassembled easily and quickly if necessary. It loads (mucks) in development or production . . . transports . . . supports 2 to 5 jib mounted drills . . . back fills, moves boulder rocks . . . makes its own roadways and cleans up completely. It can load and transport up to 100 tons per hour with a 300 ft. haul.

It's an extremely simple piece of equipment requiring little maintenance. The Gismo's initial cost can be reasonably compared with one year's maintenance cost alone of much of the conventional equipment in present use.

It makes possible a mining method requiring few machines, few men, less planning and integration. It permits total mechanization of your mine—the solution to high man-hour and materials cost.

We urge you to compare the Gismo Method with other methods—from initial investment to overall effect on your operation's efficiency. Call, wire or write us today! *Sanford-Day Iron Works, Inc., P. O. Box 1511 . . . Telephone 3-4191, Knoxville, Tennessee.*

Sanford-Day IRON WORKS

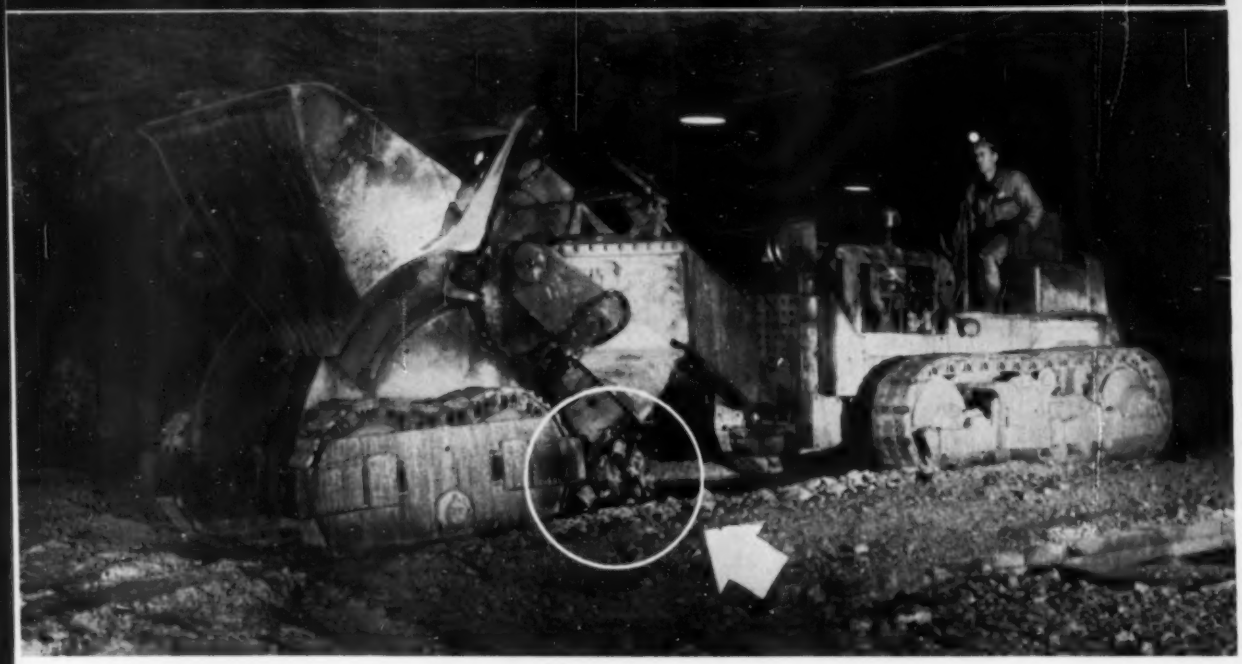
KNOXVILLE • TENNESSEE

AND BROWN-FAYRO DIVISION

MINE CARS, All Types - PRECISION WHEELS - "Brownie" HOISTS CAR RETARDERS - SPOTTERS PUMPS - OIL SPRAY SYSTEMS

LOADING (MUCKING)— a one-man operation! The speed of the GISMO Self-Loading Transport can be fully appreciated and understood only when seen in actual operation. With sufficient ore and ample surge capacity, one GISMO as a self-loading transport and one GISMO equipped as a stope drilling jumbo will excavate out of a hard rock face over 400 tons in a six hour working time shift. The GISMO handles boulders . . . sets them aside for secondary blasting . . . and does not require a bulldozer, road grader or any other accessory device. The operator has complete control of his shoveling grade—can always look directly at the dipper edge. The shoveling action is gentle. Carrying capacity of the GISMO shown working below is 6 tons. Other capacities are available.

GOALS FOR ROCK MINING!



DUMPING: direct into surge pocket . . . skip pocket . . . conveyor for truck loading . . . or mine cars with ramps (for development work). GISMO above is dumping load into surge pocket. Both when mucking (loading material into body of GISMO) and when dumping the load, the dipper or shovel head is in position shown above. The surge pocket disconnects from a time cycle standpoint the next operation, transportation—permitting GISMO and the transportation system to operate independently of each other for maximum efficiency and production.

TRAMMING: fast and highly maneuverable! GISMO shown below is transporting load to a surge pocket. When emptied, GISMO will return to reload with dipper in position shown below. As you can guess, the GISMO is a very simple machine functionally and mechanically. Compared to any other loading or mucking device (none of which are transports), the GISMO has a very large capacity.

DRILLING: The GISMO will mount 2, 3, 4 or 5 drills at ideal locations for the efficient drilling of small or large headings, benches, rib-slabbing or back-slabbing. The GISMO Stope Drilling Jumbo mounting four drills and operated by two men often averages by the month over 400 feet per man shift. The Gismo Drill Jumbo can be easily converted to a Gismo Self-Loading Transport.

International distributor delivers...

500 TD-24's

For pioneering and road building in the rugged northwest

Howard-Cooper Corporation, one of International's 31 Western area distributors, have just delivered their *500th TD-24!*

You see this big 200 bhp crawler already at work for Wooley Logging Company, Drain, Oregon.

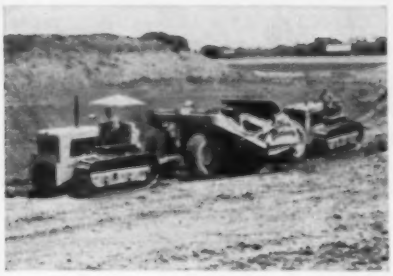
In rough, tough, Pacific Coast, big-scale logging, mining, and earthmoving, profitable production depends upon positive load-control, up-grade or down. *The TD-24 is the only tractor built that has planet-power steering—which gives you constant load control on both tracks when turning.* That's why the TD-24 out-produces the others so decisively, with dozer, arch, or scraper! Another big TD-24 advantage is its built-for-the-West construction. Records, on fleet after fleet, prove that TD-24's stand up under the toughest conditions—and consistently cost less for maintenance than any other make on tracks! TD-24 high-altitude performance is a big advantage, too—so is its seconds-fast, cold-weather starting and operating ease!

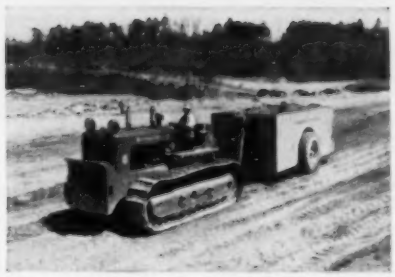
Oregon's 500th TD-24 is already at work. Here, it clears trees and stumps for a new, main truck-haul road near Brush Creek. "I like its torque converter," says Operator Dean Russum. "You get more power without track slippage and you no longer rough up the machine with shock loads."

TD-24's

6 for A. J. Orlando on Massachusetts Turnpike—Most of the tractor work on this Whiteside (N.Y.) contractor's 4.89-mile, 2,500,000-yard, $3,340,000 section of the Massachusetts Turnpike is being done by TD-24's. One pushing 3 scrapers accounts for 4,500 pay yards every 10 hours (scrapers on 1,500-ft. one-way hauls). Others pull rippers, level fills, etc.

If you're in the market for a big tractor, you owe it to yourself to check the leader . . . the International TD-24. Five-hundred owners in just one area have proved it their "Best Buy." If it can so successfully and so profitably lick the tough rock, cold weather, and mountain grades of Oregon, it can successfully and profitably lick your high-cost jobs, too! Let us prove its advantages with a demonstration. Call to arrange time and place.





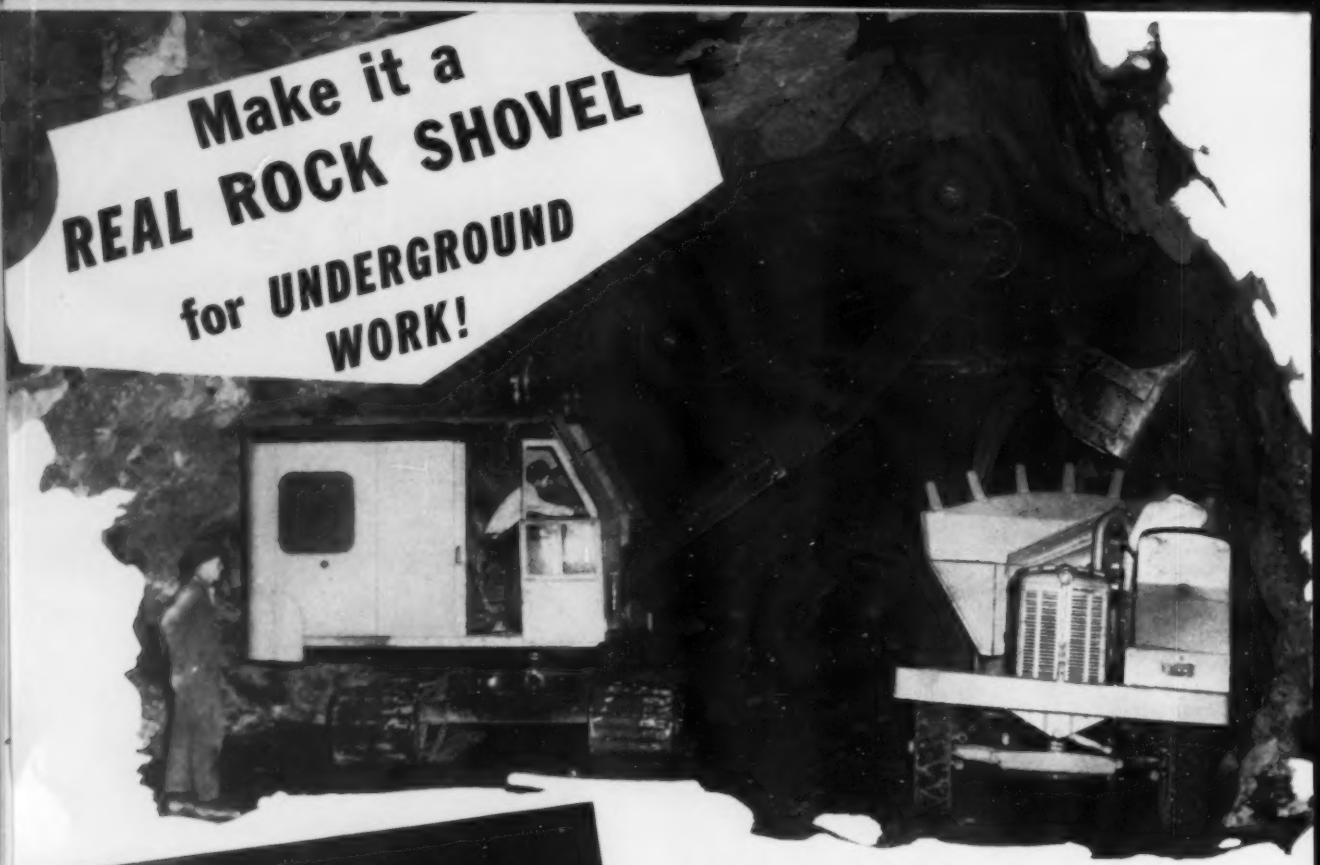
PAY OFF ACROSS THE COUNTRY

6 for J. D. Armstrong on Kansas Turnpike—Of their 9 TD-24's, this Ames (Iowa) contractor reports all have run 5,000 hours or more before needing any repair work. Six on 1.7-mile, million-yard Turnpike section near Emporia, are towing 50-ton rollers, pulling and push-loading scrapers. On hauls of 700 to 2500 ft., they account for 5,000 pay yds. per day.

2 for J. W. Moorman on Buford Dam, Georgia—These "24's", two of the five now owned by Moorman, push-loaded scrapers or pulled 50-ton rubber-tired rollers, 18 hours every day for 18 months. On compaction, they averaged 180,000 cubic yards weekly for the 200-ft.-high, 1630-ft.-long main dam. Moorman's other TD-24's are used to push-load scrapers, and pull or push belt loaders.

3 stripping overburden for Meyer Bros., Pennsylvania—"Proven crawlers," says Partner George Meyer of his TD-24's. "We've used our 3 for 3 years now. They have good balance plus unmatched push power." Right now, rigs are removing 30 feet of shale and clay to uncover a 30-inch vein of bituminous coal. The 2 TD-24's do 80% of the job; a large shovel, 20%.

Make it a REAL ROCK SHOVEL for UNDERGROUND WORK!



NORTHWEST ADVANTAGES will mean even more underground, where smoothness and accuracy of handling takes on greater importance than on the surface.

On jobs like these the "Feather-Touch" Clutch Control frees you from the complications of delicate pumps and compressors which often require special knowledge for adjustment. Uniform Pressure Swing Clutches eliminate the jerks and grabs that delay spotting the load and reduce output. The Northwest Dual Independent Crowd utilizes force most independent crowd shovels waste. It's a clean cut into the bank — no stutter — no restarts — no dipper juggling! Simplicity of design makes upkeep easy in underground conditions which may often be tough and Northwest steering gives easier maneuvering in the close quarters of tunnel work.

These are just a few of the Northwest features that have proved a Northwest to be a *real hard* Rock Shovel underground as well as in surface pits. Ask for more details. There is a Northwest Man near you.

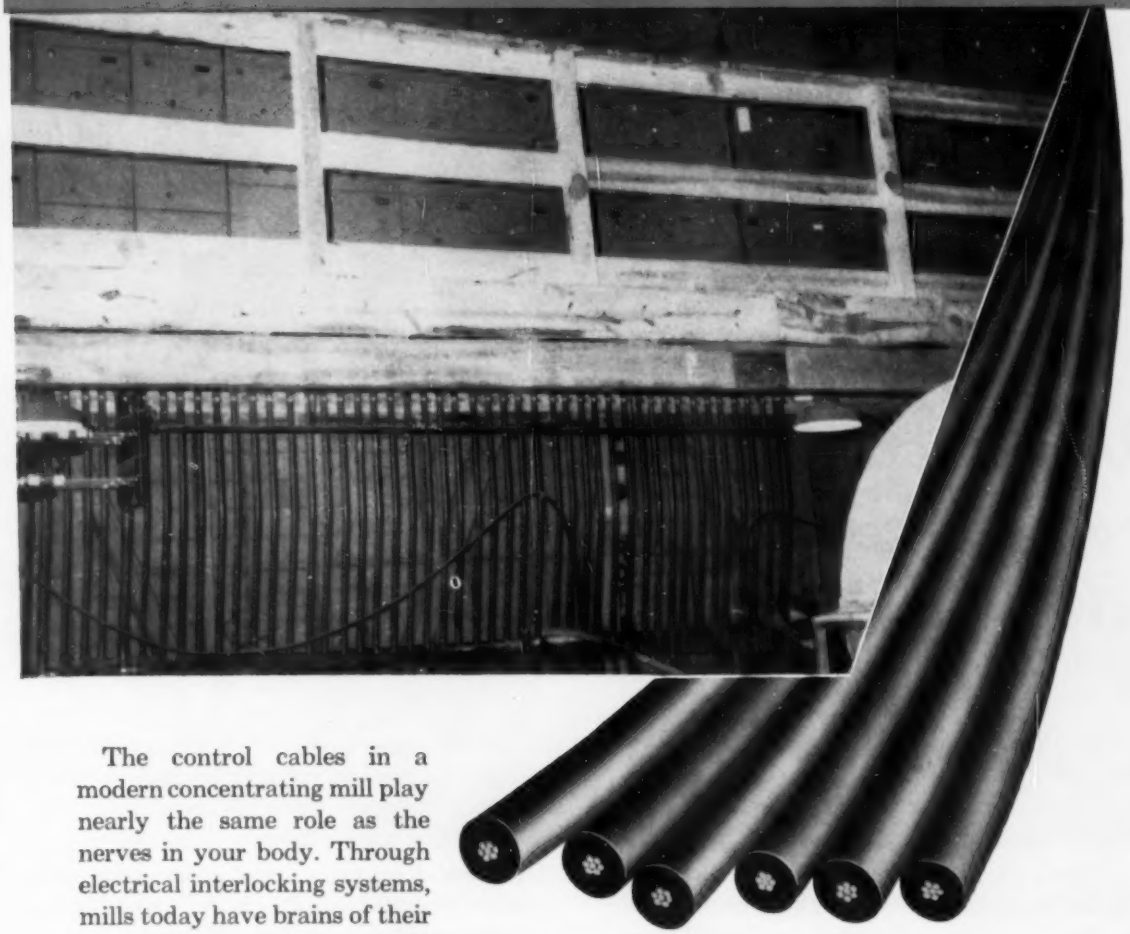
NORTHWEST ENGINEERING COMPANY
1511 Field Building, 135 South La Salle Street, Chicago 3, Illinois

DIESEL or ELECTRIC

Has Your Shovel Stood the ROCK TEST

NORTHWEST

Simplex Cables Serve Your Mill As Nerves Serve Your Body!



The control cables in a modern concentrating mill play nearly the same role as the nerves in your body. Through electrical interlocking systems, mills today have brains of their own. These systems apply power to units, in the proper sequence, after the proper time interval.

Behind this central control are thousands of feet of Simplex cable carrying high and low voltage in one or more conductors. Their current capacities vary, as do the physical and chemical conditions under which they operate.

Simplex makes every cable needed for mills. Simplex cables were designed for, and tested in, the mineral industries. The help and advice of Simplex sales engineers is available at any time.

Keep the nerve system of your mill strong by installing Simplex cables. They're the best cables you can buy.

Simplex
CABLES

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

The "Lohed's" simple, rugged construction is evident in this view of the car in dumping position (with end cover removed).

Designed to reduce your ore handling costs

75 years experience aimed at one goal—reduce ore handling costs. That's the design and development story of Lake Shore's complete line of mine cars and related ore handling equipment.

Here's a typical example of this development . . . the "Lohed" mine car. With all welded construction it stands up better than the old rivet type car under the hard knocks of everyday operation. Its simplified design is strong . . . yet light in weight. Rounded corners add stiffness, prevent ore sticking . . . mean faster, cleaner dumps.

What's more, inspection and maintenance, when it's needed, is a snap. Just pull six pins to remove the car body from the truck.

Features like these add up to greater production, less down-time, lower maintenance costs, *reduced ore handling costs.* This advanced thinking is engineered into every Lake Shore car—standard and special models. Before you buy, talk to the people at Lake Shore and see how these advantages can be applied to your operation, to help you move more ore at lower cost.

LAKE SHORE, Inc.

Lake Shore Engineering Division

IRON MOUNTAIN 1, MICHIGAN

GM DIESEL
CASE HISTORY No. 556-188

OWNER: Badgett Mine Stripping Corporation, Madisonville, Ky.

INSTALLATION: GM "6-110" Diesel-powered Bucyrus-Erie 3-yard shovel loading fleet of GM Diesel-powered Euclid rear dumps on Pennsylvania Turnpike extension project.

PERFORMANCE: Partner Brown Badgett says GM Diesels are "doing a wonderful job." He's running his shovel 10 hours a day, plans to start 24-hour operation soon.

"Doing a Wonderful Job"

FEW WOULD expect to find a mine-stripping contractor on a road-building job. However, where there's dirt and rock to be moved in a hurry it is *not* unusual to find a General Motors Diesel-powered excavator. The faster, livelier crowd and swing of a "Jimmy" powered shovel means more yards per day at a lower cost per yard.

Principal reason for this snappy action is that a GM 2-cycle Diesel delivers power on *every* piston downstroke—not on every *other* downstroke as in 4-cycle engines. That means faster acceleration, instant response to throttle demands, real "go" when the bucket takes a bite.

And a GM Diesel costs less to maintain, too. Valves cost up to 62% less, cylinder liners cost up to 40% less, than similar parts for other Diesels.

More than 150 different manufacturers pick GM Diesel power for over 850 different models of equipment they build. Your GM Diesel distributor can give you the list plus full information on GM Diesel engines. See him today or write direct.

DETROIT DIESEL

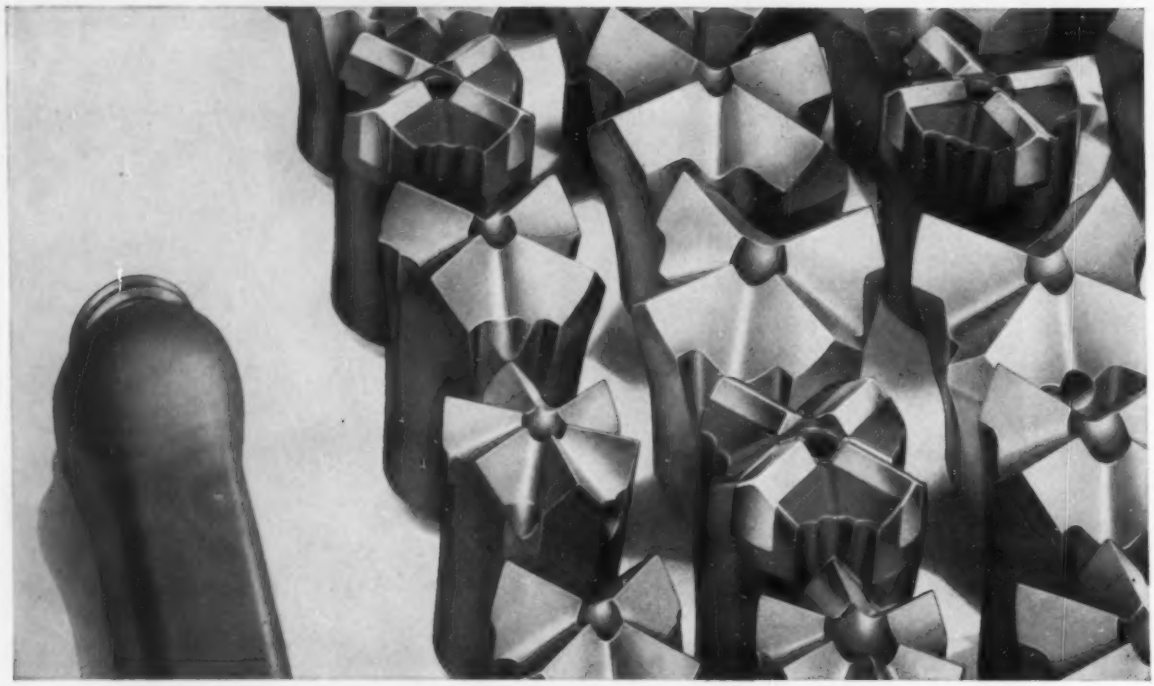
ENGINE DIVISION OF GENERAL MOTORS

America's Largest Builder of Diesel Engines

Single Engines . . . 30 to 300 H. P. Multiple Units . . Up to 893 H.P.

GM GENERAL MOTORS DIESEL POWER

JUST CHANGE THE BIT—USE THE SAME STEEL AND SAVE TIME



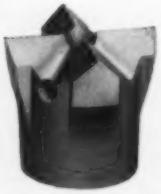
TIMKEN® interchangeable rock bits let you switch bit types... easily, quickly... without switching drill steels

YOUR drillers will save valuable drilling time with Timken® interchangeable rock bits. Both types, multi-use and carbide insert, fit the same steel, can be changed fast right on the job. Simply screw one type off, screw another right on the same steel.

This means new drilling economy—new savings in time, new boosts in production. Drillers can quickly switch to the most effective bit as the ground changes, instead of going after a different type of drill steel every time a different bit type is needed. What's more, because dozens of different Timken multi-use and carbide insert bits fit the same steel, you save on drill steel inventory.

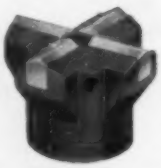
Timken carbide insert and multi-use bits are both made from electric furnace Timken fine alloy steel. And both have the shoulder union, originated by the Timken Company, that keeps drilling impact from damaging threads.

Our rock bit engineers, backed by more than twenty years' drilling experience, can help you save money. No obligation, naturally. The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



HOW TIMKEN MULTI-USE BITS SAVE YOU MONEY

Most economical for ordinary ground. With correct and controlled reconditioning, they give lowest cost per foot of hole when full increments of steel can be drilled.



WHERE YOU CUT COSTS WITH TIMKEN CARBIDE INSERT BITS

Give highest speed through hard, abrasive ground. Also most economical for constant gauge holes, small-diameter holes, very deep holes.

... your best bet for the best bit... for every job

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

Capitol Concentrates

Tariff Cuts Loom for Many Minerals In Reciprocal Trade Negotiations

The State Department has announced that the United States will participate in "multilateral and reciprocal trade negotiations" with 25 foreign countries in January 1956 at Geneva, Switzerland. A list of some 1,000 commodities that may be the subject of negotiations was released.

As a prelude to the Geneva meeting, the Committee for Reciprocity Information opened hearings October 31 to receive the views of interested persons on possible concessions that may be granted or obtained by this country. The United States Tariff Commission, on the same date, started public hearings in connection with its "peril point" investigations, to determine the extent to which the United States concessions may be made without causing or threatening to cause serious injury to domestic industry producing like or directly competitive products.

Under the recently renewed Trade Agreements Act, the United States government has authority to cut all tariffs 5 percent a year for the next three years and to roll back 50 percent of the value of an imported item any tariff which is now above that level. United States negotiators are said to plan to offer the full 15 percent slash in a "package" spread over three years, rather than negotiate each 5 percent reduction separately.

Included in the long list of commodities that may be subject to tariff concessions are many products of domestic mines, both metallic and nonmetallic.

• Uranium Boom Proves Old Sayings

The uranium boom is an excellent example of the old sayings that ore is where you find it and that someone will find it if the price is right. Uranium ore is turning up over a wide area and under geologic conditions which a few years ago would have been thought incredible.

• Barter Authority May Be Increased

The Commodity Credit Corporation, the Agriculture Department's agency which conducts barter negotiations, reports that during fiscal 1955 it had received deliveries of strategic and other materials totaling $82,500,000. On the basis of national security, no breakdown as to materials is made public.

In most instances, it is said, materials delivered under barter contracts have been turned over to other government agencies as appropriated funds became available, and CCC has been reimbursed in full. Some materials are held by CCC, and such quantities as are within the long-term stockpile objectives will be transferred to other agencies as appropriated funds become available. The remainder which has been acquired against the supplemental stockpile will be held for account of CCC.

Currently, CCC will consider barter proposals for aluminum, antimony, asbestos, bauxite, beryl ore, bismuth, chromite, cobalt metal, graphite, magnesium, manganese ore, mica, nickel, platinum, palladium, rare earths, selenium, and talc.

Reports in Washington indicate that a determined effort will be made in the next session of Congress to increase the Agriculture Department's barter negotiations for surplus United States agricultural products in exchange for stragetic and other "storable" materials.

• Two Down — One To Go

General Services Administration has announced that the manganese ore purchasing station at Deming, New Mexico, will close November 30, 1955. By that date the station is expected to have received its quota of 6,000,000 long ton units of recoverable manganese, and no further shipments will be accepted.

The Deming shutdown follows the May closing of the purchasing depot at Wenden, Arizona, when its assigned quota was attained. It leaves only the Butte-Philipsburg buying station still in operation, to receive low-grade manganese ores. At the current rate of shipments to Butte, this station may be able to continue in operation until the expiration of the program, June 30, 1958.

Legislation which would have extended the purchasing authority for manganese, as well as other strategic metals and minerals, was passed by the Congress last summer, but the measure received the President's pocket veto.

• ODM Mercury Purchases Seem Remote

The strengthening of the mercury market makes even more remote the possibility that the Office of Defense Mobilization will be able to complete its announced stockpile purchase program at $225 per flask for domestic metal. Spot quicksilver of domestic and European origin has been quoted at $280-$285 per flask of 76 pounds in recent markets.

Current reports indicate, however, that Italy will be offering quicksilver for sale in the United States market after the first of the year—if the price is right. Italian quicksilver has not been freely offered in the domestic market since early in 1954. In addition, shipments of Mexican quicksilver from Vera Cruz and Tampico are getting underway. These two factors are said to be causing United States purchasers to show more caution in making forward commitments.

The Engineer's Field Report

CASE HISTORY

LUBRICANT Calol Vistac Oil

LOCATION Utah

Tough oil film protects mine roof bolters operating in water and heavy abrasive dust

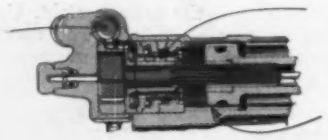
WORKING CONSTANTLY in heavy abrasive dust, high humidity and water, these Joy roof bolters (above) eliminate crossbar timbering, for safety and increased production in one of Utah's largest coal mines. Lubricated exclusively with Calol Vistac Oil 28X since first put in service, these air tools drill holes, hammer bolts and tighten nuts on steel bearing plates. Bolts up to 8 feet long are rammed in to refusal at pressures up to 3,000 lbs. psi. The master mechanic for underground operations at the mine reports: "Calol Vistac Oil has proved completely satisfactory for this tough service. It continues to lubricate and protect these machines even under our most difficult dust and water conditions." Calol Vistac Oil is also used in all other air equipment in the mine.

FREE CATALOG: "How to Save Money on Equipment Operation" will be sent on request to Standard Oil Company of California, 225 Bush Street, San Francisco.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your distributor, write or call any of the companies listed below.

CALOL

Why CALOL Vistac Oil cuts costs in air-tool equipment



Atomizes quickly and completely—carries evenly over all parts. Prevents excessive fogging and has no unpleasant odor.

Additives help form tenacious, oily, pressure-resistant film in wet or dry conditions—cuts wear and power loss. Small quantity lubricates efficiently.

Resists high temperatures and oxidation. Stays fluid at low temperatures.

TRADEMARKS "CALOL", "VISTAC" REG. U. S. PAT. OFF.

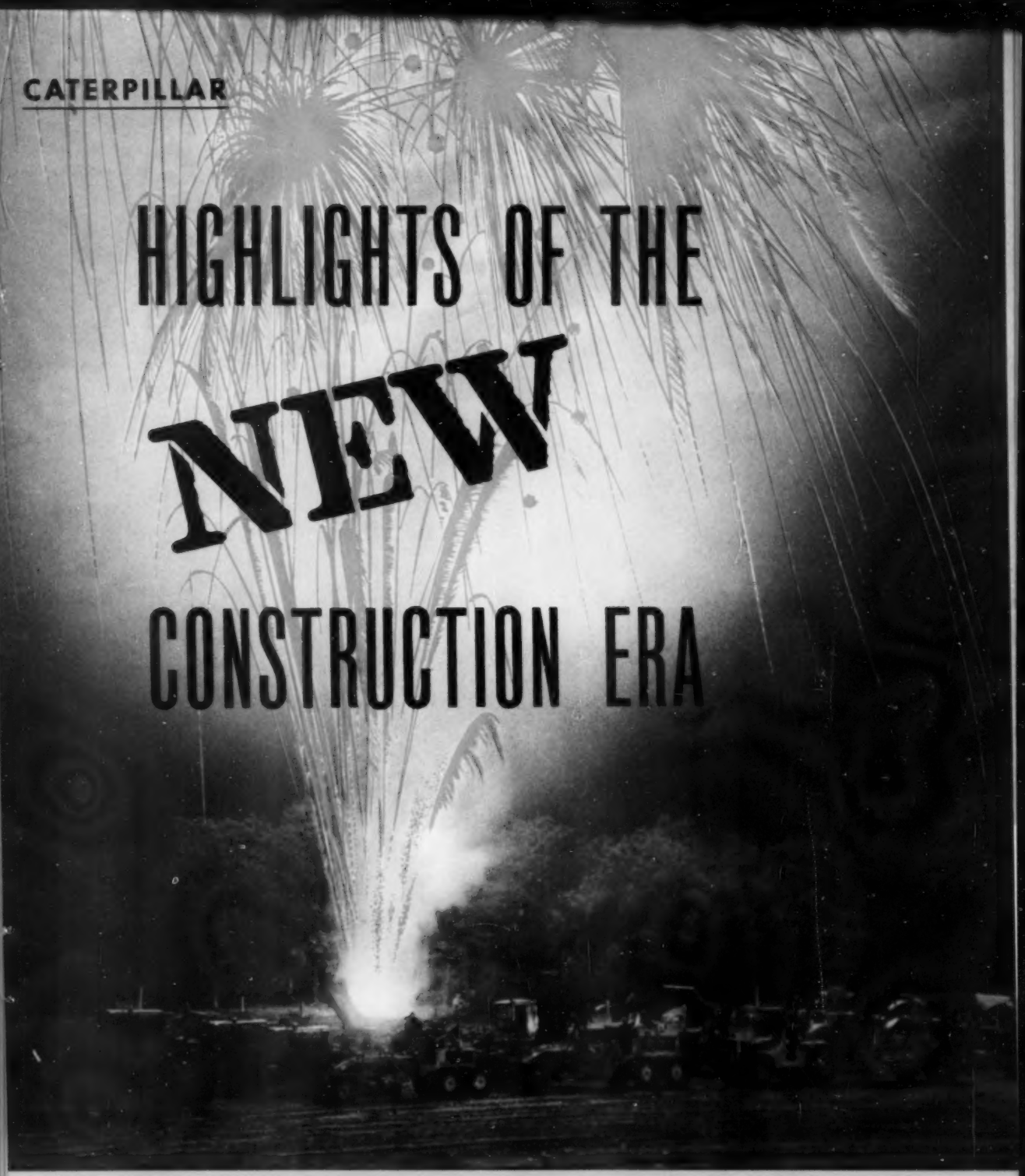
STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street • San Francisco 20, California

THE CALIFORNIA COMPANY
P. O. Box 780 • Denver 1, Colorado

STANDARD OIL COMPANY OF TEXAS
P. O. Box 862 • El Paso, Texas

CATERPILLAR

HIGHLIGHTS OF THE NEW CONSTRUCTION ERA



Never before in history has the equipment industry faced such a tremendous challenge as today. We are entering what might well be called the "construction era." Right now construction is the greatest single factor in our industrial economy, employing 12% of our total labor force. And construction can never move forward by itself. Its progress is dependent upon increased production in mines and forests, cement mills and steel plants. Caterpillar Tractor Co. is matching these new opportunities with an array of new products that will increase production, cut maintenance costs, work longer and more profitably than any other equipment on the market. These Caterpillar-built products are the result of continuing research in the laboratory and in the field. They are forceful evidence of Caterpillar Leadership in Action. See them on the following pages.

NEW in track-type tractors!

The new D9

This new giant is a bear for work. Choice of torque converter or exclusive oil clutch drive. First track-type tractor with Turbocharger. Completely new 286 HP engine. "Live-shaft" drive for rear-mounted equipment. Many other important features.

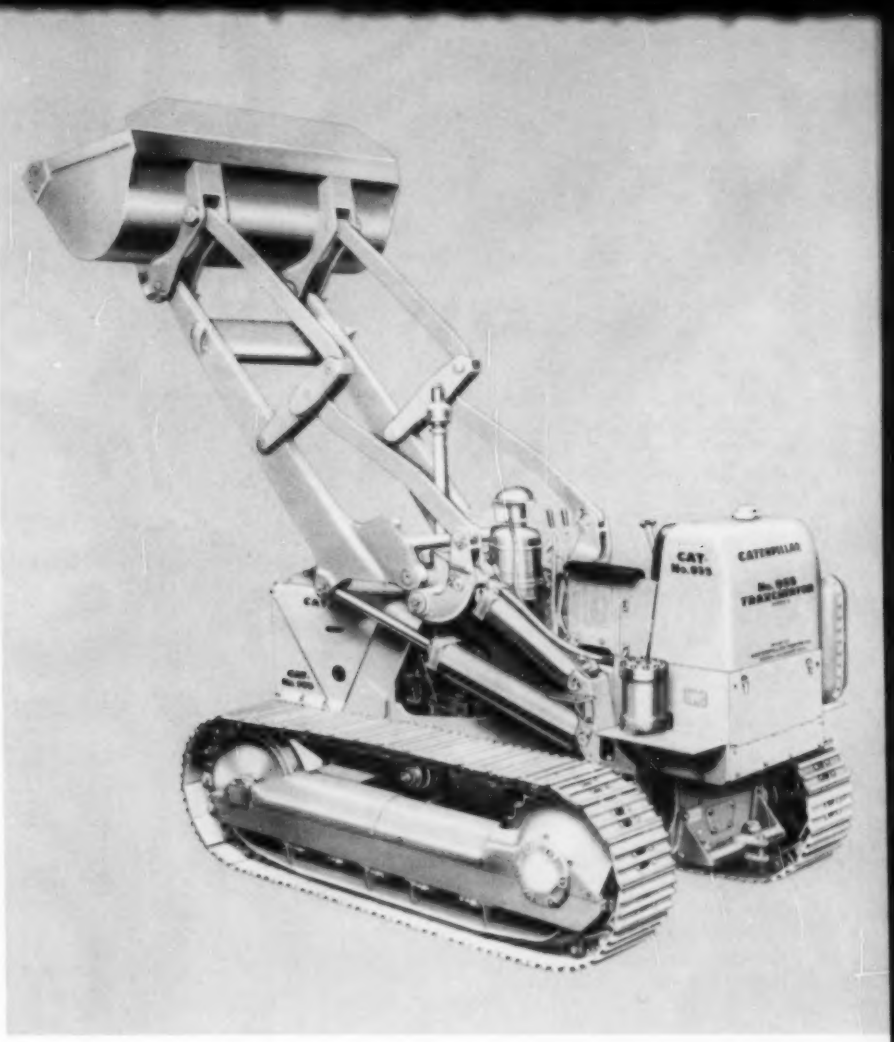
The new D8

With torque converter (Series D) or direct drive (Series E). Completely new 191 HP engine. "Live-shaft" drive for rear-mounted equipment independent of flywheel clutch. New easy controls. Many other improvements. Shown with new Cat No. 463 LOWBOWL Scraper.

The new D7 (Series C)

New 128 HP engine. Drawbar pull 28,700 lb. maximum. Exclusive oil clutch. Finger-tip steering. New starting engine for easier operation. Track shoes hardened by "*water quench*" process (also on D8 and D9). Many other important advances.

LEADERSHIP IN ACTION



No. 955—1½-yard capacity

Balanced for bigger production at lower cost. Major features: 40-degree bucket tip-back at ground level, new oil-type clutch, convenient lift and dump levers, modern hydraulic system, high reach, "designed in" operator comfort, optional starting and versatile attachments.

NEW in Traxcavators!

No. 933—1-yard capacity

Like its bigger brother, *balanced* to outproduce ordinary tractor-shovels of equivalent capacity. Also backed by *one* manufacturer to provide you the advantages of single manufacturing responsibility and one service source. Major features—same as the No. 955!

LEADERSHIP IN ACTION

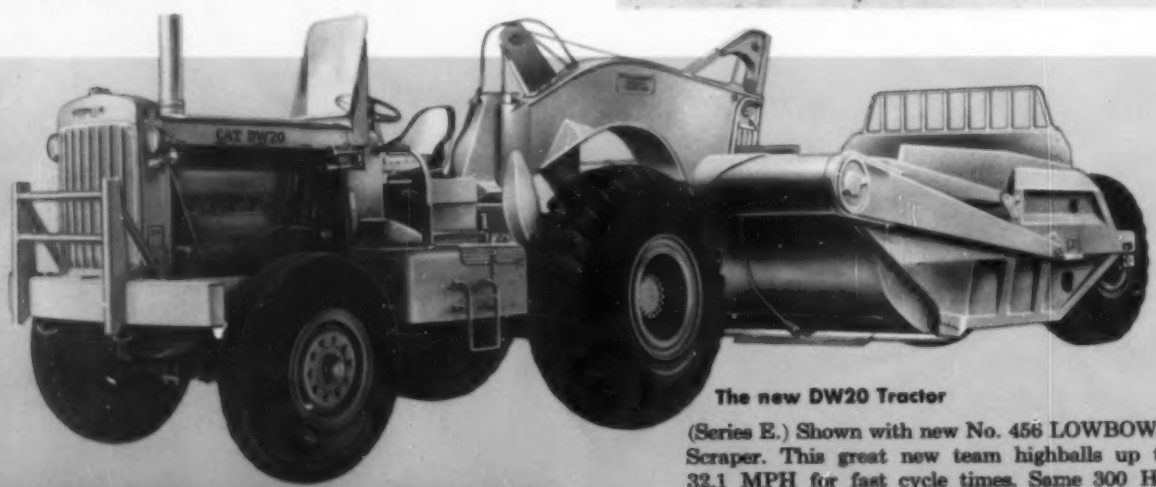
NEW in wheel-type tractors!

The new DW21 Tractor ▲

(Series C.) New 300 HP Caterpillar Engine with Turbocharger. 10% more rimpull. New No. 470 LOWBOWL Scraper. 18 cubic yards struck, 25 cubic yards heaped capacity. New, wide-section 29.5-29 tires give big-foot-print flotation and maximum traction. Many other new, thoroughly tested features.

The new DW15 Tractor ▶

(Series C.) 186 HP valve-in-head Caterpillar Engine. Speeds up to 24 MPH (31.3 MPH with optional gears) pulling loaded wagon or scraper. Heavy-duty clutch has air booster. Air brakes. Wide range of speeds: 10 forward, 2 reverse.



The new DW20 Tractor

(Series E.) Shown with new No. 456 LOWBOWL Scraper. This great new team highballs up to 32.1 MPH for fast cycle times. Same 300 HP engine with Turbocharger and wide-section tires as DW21. LOWBOWL design loads more material in less time by using tractor and pusher power at maximum efficiency.

LEADERSHIP IN ACTION

NEW in pipelayers!

The new No. 583

Here, for the first time, is a pipelayer that is *all* pipelayer—not a tractor attachment. It's the most efficient, highest capacity pipelayer in history. Lifting capacity of 130,000 pounds and 21-inch clearance. Three-stage torque converter in main drive and new hydraulically actuated counterweights. Stability is unequalled. A heavy-duty constant-mesh pipelayer winch transmission drives directly from the engine. Many more important advances, all designed to produce more profits for pipeliners.

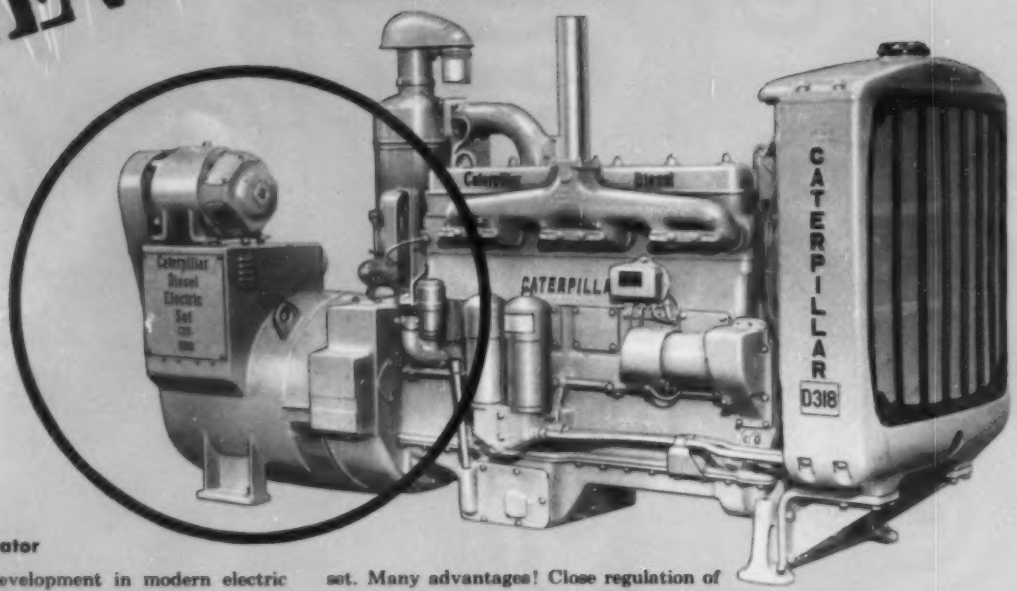
NEW in motor graders!

The new No. 12 with oil clutch

With the addition of the job-proven oil clutch, the big, versatile No. 12 Motor Grader gives you more economy and efficiency than ever. The new clutch increases work life since the constant oil bath lubrication reduces wear on all moving parts. There is less maintenance; 1500 hours without adjustment is not unusual and no external lubrication is needed. The new No. 12 is more efficient because the clutch is constantly cooled, eliminating clutch fade and slippage due to overheating.

LEADERSHIP IN ACTION

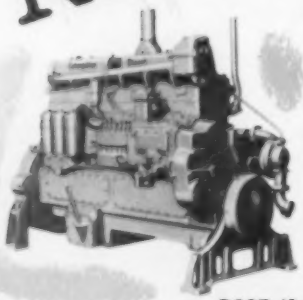
NEW in generators!



Cat Generator

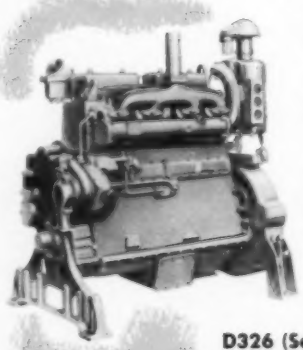
A major development in modern electric power. Brings to Caterpillar's new line of Diesel Electric Sets the efficiency of the externally-regulated set in a self-regulated set. Many advantages! Close regulation of voltage, simple control, excellent motor-starting ability, easy hook-up with other generators . . . 100% backed by Caterpillar.

NEW in diesel engines!



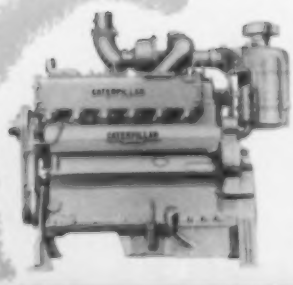
D342—210 HP maximum @ 1200 RPM

Incorporates the latest advances in modern, compact, heavy-duty diesel design. Offers better operation, less maintenance, higher horsepower. Choice of 3 starting systems—air, electric, gasoline. Like all Caterpillar Engines, burns wide range of fuels without fouling.



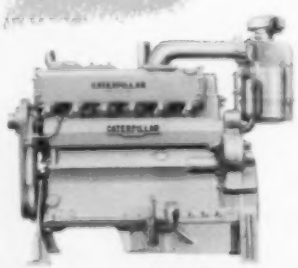
D339—140 HP maximum @ 1200 RPM

Combines new compactness with greater efficiency, economy and higher horsepower. A modern, heavy-duty 4-cylinder unit with new smoothness of operation. Choice of 3 starting systems. Many other advantages, including full-flow filtering system.



D337 (Series F) with Turbocharger 310 HP maximum @ 2000 RPM

New Turbocharger utilizes exhaust heat to drive supercharger, delivers air in proportion to engine's need. New hydraulic valve lifters practically eliminate adjustment, provide quiet operation. Greater displacement for more power. Choice of 3 starting systems. Available as Electric Sets and Industrial Engines with complete line of attachments.



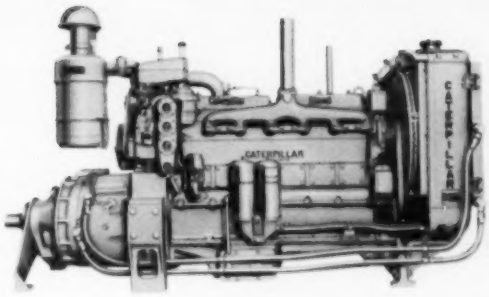
D326 (Series F)—200 HP maximum @ 2000 RPM

Like other new, heavy-duty Cat Diesels, offers you more for your money than any engine in its power range. Many major features, including hydraulic valve lifters and full-flow filtering. Greater displacement for more power. Choice of 3 starting systems. Available as Electric Sets and Industrial Engines with complete line of attachments.

LEADERSHIP IN ACTION

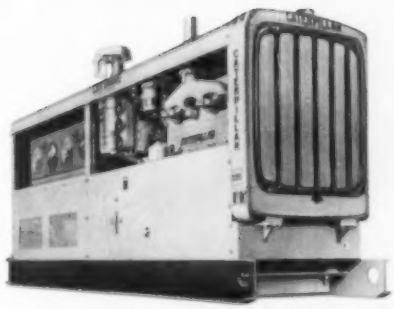
NEW in torque converters!

Caterpillar now offers a wide choice of torque converter power units in standard packages. Torque output is automatically matched to load for smooth load starts or control of load without use of clutch. Overloads can't kill engine. Your Caterpillar Dealer can supply these units. He also has full facilities and parts for service.



NEW in welders!

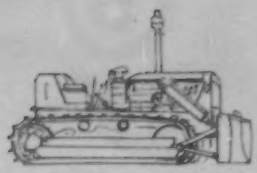
The new Caterpillar Twin Arc-Welder provides one engine, one base, and TWO 300-ampere welding generators. Four-cycle Cat Diesel picks up load instantly without missing or injector trouble. Compact design cuts transport and maintenance cost. Operators can weld at different voltages at same time. Single (3 KW) exciter cuts weight and size, provides ample excitation plus plenty of 115-V. DC for auxiliary tools.



NEW in portable electric sets!

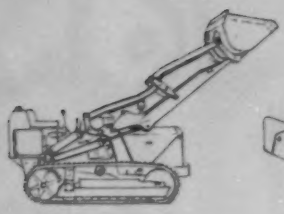
Cat Portable Electric Sets are now available in nine models, 30 to 315 KW, and in all usual voltages, 50 to 60 cycle. They're complete units with cooling system, fuel tank and switchgear, mounted on skids, semi-trailer or full trailer. Easy to hook up and operate, ready to work anywhere.

LEADERSHIP IN ACTION

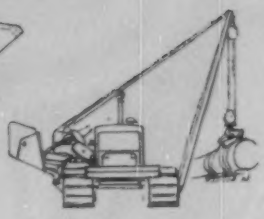


TRACK-TYPE TRACTORS

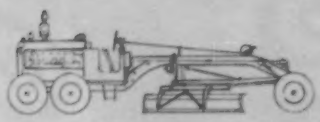
WHEEL-TYPE TRACTORS



TRAXCAVATORS



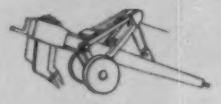
PIPELAYERS



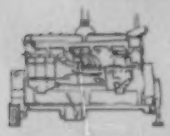
MOTOR GRADERS

SCRAPERS

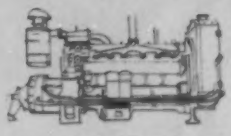
BULLDOZERS



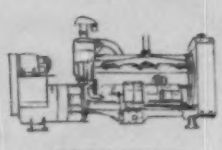
RIPPERS



INDUSTRIAL ENGINES

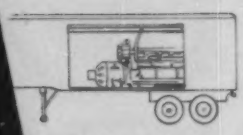


TORQUE CONVERTERS



GENERATORS

FOR YOU CATERPILLAR LEADERSHIP PROVIDES THE MOST COMPLETE LINE IN THE INDUSTRY



PORTABLE ELECTRIC SETS

WELDERS

Year after year you have seen the results of Caterpillar leadership. It is always in action. It never stands still. The full resources of Caterpillar research, both in the laboratory and right in the field with you, are constantly devoted to improving products and developing new ones. This means that Caterpillar is your partner in progress, bringing you better and better products, greater opportunities for profitable work. Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

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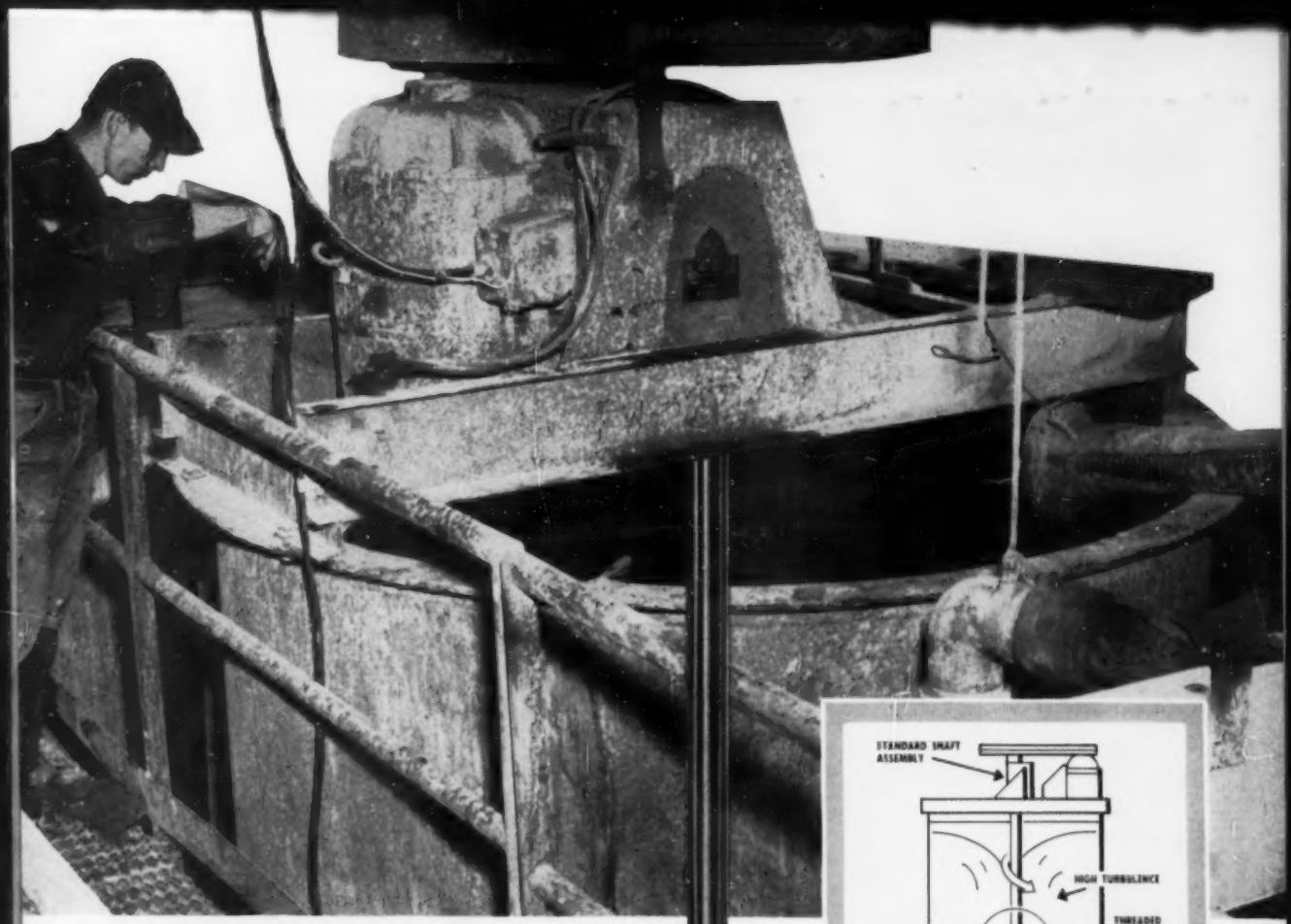
LEADERSHIP IN ACTION



DENVER AGITATORS are STANDARD in URANIUM MILLS

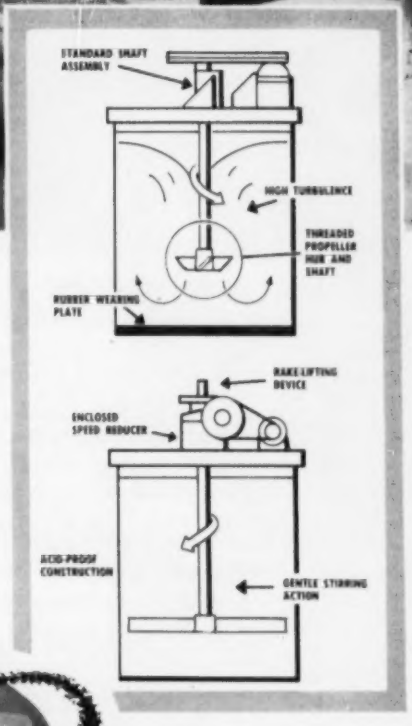
The Reason? . . . BEST RESULTS!

1. Simple Operation, Low Horsepower
2. Longer Service, Less Maintenance
3. Lower Cost
4. Threaded Propellers for Corrosive Applications

PLUS the fact that they DO THE JOB BETTER!

SPECIFY DENVER for Agitators in your mill.

"Have you studied Denver Equipment Company Engineers' Recommendations?"



Threaded propeller and shaft can save you many hundreds of dollars by quick replacement and by getting back into production fast. No need for long shut down or stand-by units.

"The firm that makes its friends happier, healthier and wealthier"

DENVER EQUIPMENT COMPANY

1400 SEVENTEENTH ST.
DENVER 17, COLORADO
PHONE: CHERRY 4-4466

THIS AMSCO® LIP TAKES A SHARPER BITE

. . . chews out full loads at normal power

The lip juts way out where it easily bites up—and delivers—the full yardage of rock or earth. It's a sharp *extension* of the dipper, with fanned teeth—for fast, easy penetration. The dipper digs out a heavier load without strain on the shovel . . . even requires less power, and prolongs life of all parts.

This Amsco lip lasts a long, long time, because it's made of the toughest steel known—manganese steel—the metal that work-hardens to fight off wear by impact and abrasion. Lip replacement is simple, when necessary, keeping downtime short.

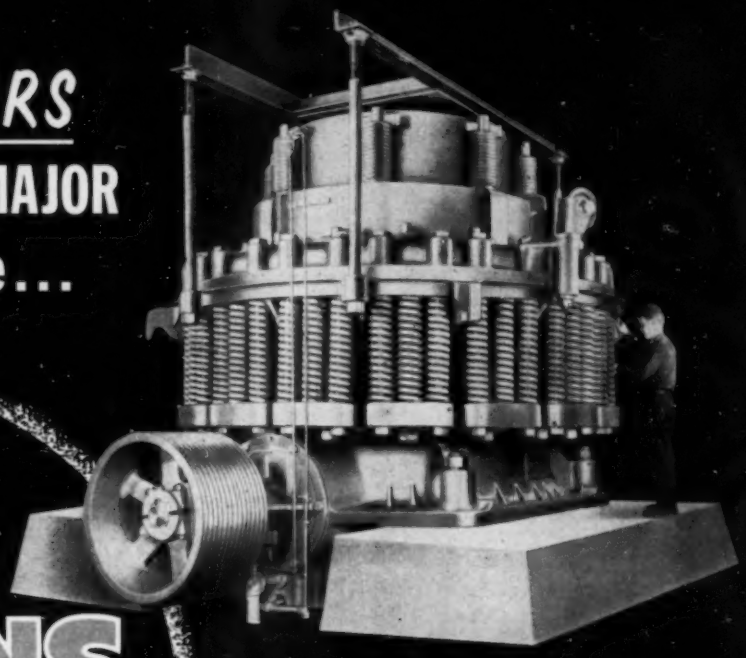
If getting more pay loads moved faster with less wear on equipment means more profits to you, *specify Amsco Renewable Lip Dippers.*

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Ill.

REPEAT ORDERS

from the WORLD'S MAJOR PRODUCERS prove...



There is no substitute for SYMONS® CONE CRUSHERS

...here are a few good reasons:

- LOWEST COST PER TON OF CRUSHED PRODUCT
- UNIFORM CONTROLLED FEED
- MAXIMUM LINER UTILIZATION
- GREAT CAPACITY OF FINELY AND UNIFORMLY CRUSHED PRODUCT
- LOW COST—TROUBLE-FREE OPERATION

Symons Cone Crushers, *the machines that revolutionized crushing practice*, are built in Standard, Short Head and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour.

Proved in the profitable reduction of these and many more ores and minerals . . .

- ASBESTOS
- ABRASIVES
- CEMENT
- CHROMIUM
- COPPER
- FELDSPAR
- GOLD
- GRAVEL
- IRON ORE
- LEAD
- LIMESTONE
- MANGANESE
- MOLYBDENUM
- NICKEL
- SILVER
- SLAG
- STONE
- TACONITE
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- TIN
- TUNGSTEN
- URANIUM
- VANADIUM
- ZINC

SYMONS — A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD

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SYMONS PRIMARY GYRATORY CRUSHERS

GRINDING MILLS

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SYMONS VIBRATING GRIZZLIES and SCREENS

DIESEL ENGINES

C355

Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

December 1955

INTERNATIONAL PANORAMA

MONTREAL, QUEBEC—The British Aluminum Company Ltd. will build a primary aluminum plant with an annual capacity of 160,000 tons in eastern Quebec. First production is scheduled for 1957.

SAN MANUEL, ARIZONA—The San Manuel Copper Corporation has made initial test runs at its new crushing plant and flotation mill. First blister copper is to be produced about January 1, 1956.

SAN FRANCISCO, CALIFORNIA—Domestic steel production reached and all-time weekly record high of 2,413,000 tons during the week of October 24th.

URANIUM CITY, SASKATCHEWAN—The Lindsay Chemical Company has taken an option on a monazite bearing vein here. Prospecting has shown the vein to be 12 feet wide assaying 15 percent monazite.

CLIMAX, COLORADO—Climax Molybdenum Company is installing an additional unit at its 29,000-ton-per-day mill here. This unit will permit either a 3,500-ton-per-day increase in capacity or a 3.0 percent increase in present recovery with no increase in tonnage.

NDOLA, NORTHERN RHODESIA—First copper-cobalt ore has been mined by Chibulma Mines Ltd., the newest copper mine in the "Copperbelt." Ore will be stockpiled until the new flotation concentrator is placed in operation early in 1956.

VIRGINIA, ORANGE FREE STATE—Uranium was more profitable than gold during first month of uranium recovery at Virginia Orange Free State Gold Mining Co., Ltd. Uranium profit was £35,000, and gold £21,988. Kennecott Copper Corporation has a major interest in the Virginia Company.

SAN FRANCISCO, CALIFORNIA—Two new uranium companies have been awarded fast tax write-offs on their mills by the Office of Defense Mobilization. They are the Tuba City, Arizona mill of Rare Metals Corporation of America, and the Edgemont, South Dakota mill of Mines Development, Inc.

BORON, CALIFORNIA—Pacic Coast Borax Company is making plans to change its mining method from underground room and pillar to open pitting. New concentration and refining plants will be built to treat expanded ore production from the pit.

GRAND JUNCTION, COLORADO—The newly organized firm—Cullen Minerals Corporation—will manage Terminal Oil Company's uranium properties of the Colorado Plateau. Lucien Hugh Cullen, Houston, Texas oil man, heads Cullen Minerals.

NIAGARA FALLS, ONTARIO—Strategic Materials Corporation is planning to build a new plant here to produce ferromanganese by the Udy process. Low-grade ores from New Brunswick will be treated.

TORONTO, ONTARIO—Consolidated Denison Mines Ltd. has signed a $182,250,000 contract with Eldorado Mining and Refining Company for sale of uranium concentrates. Initial delivery is expected in April 1957. Termination date for shipments is March 31, 1962.

McDERMITT, NEVADA—First quicksilver, five flasks, has been sold to the United States government to start the purchase program under terms of the GSA buying schedule of 125,000 flasks which is to expire December 31, 1957. Cordero Mining Company is the initial seller.

MUNGANA, QUEENSLAND—Diamond drilling has indicated an important cobalt ore deposit near here.

SALT LAKE CITY, UTAH—Hidden Splendor Mining Company has signed a three-year contract to ship from 5,000 to 9,000 tons of uranium ore monthly to the Vitro Uranium Corporation. Vitro is seeking AEC approval for a 70 percent expansion in mill capacity here to treat this additional tonnage.

ASARCO To Terminate Its Ore Buying Work for AEC

American Smelting and Refining Company will terminate its uranium ore-buying and concentrate-receiving functions for the United States Atomic Energy Commission at the end of this year. At present ASARCO operates ore buying stations at Monticello, Marysvale, Moab, and White Canyon, Utah; Edgemont, South Dakota; Globe, Arizona; and Riverton, Wyoming. It also manages the sampling plant at Grand Junction, Coloradio where uranium and vanadium concentrates from Colorado Plateau mills are assayed.

Observers believe that ASARCO wishes to expand its effort in uranium prospecting, mine development, and milling, and the firm wants to avoid any conflicts in purpose in this program with its activities as an ore-buyer for the AEC. In 1948 when ASARCO assumed the AEC contract it was prohibited from engaging in uranium activities; these contracts were somewhat amended this year. However, no proposals from firms with interests in the domestic uranium field have been requested by the AEC in its call for a successor to ASARCO in handling ore-buying work for the Commission.

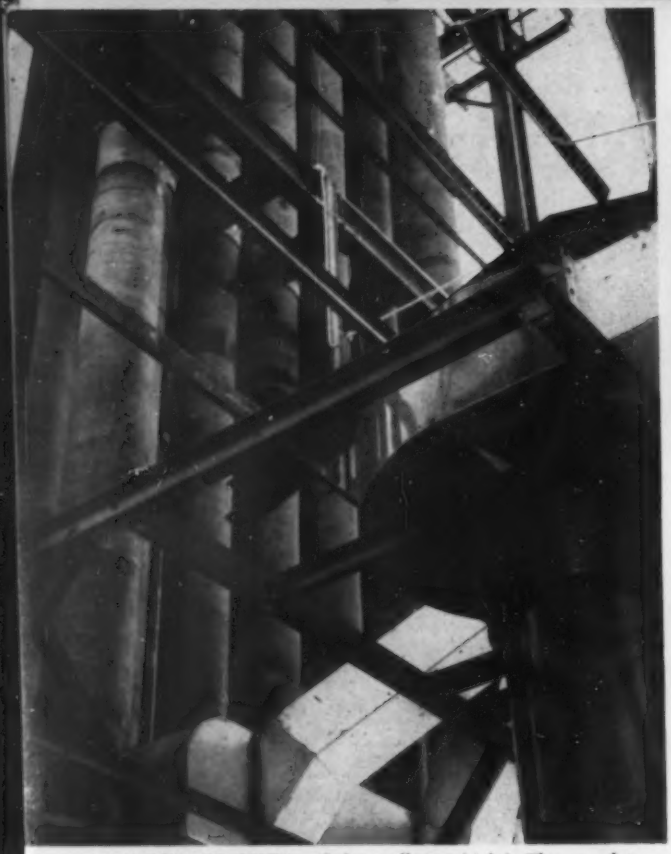
Bids have been received at the Grand Junction Operations office, and awards will be made later this month.

New Uses Sought For WO_3 To Consume High Output

The domestic tungsten mining industry may call upon Congress to save it by legislative action when Congress reconvenes in January, unless other steps are taken in the meantime.

As of October 30, 1955, latest audited figures received from the General Services Administration showed that 2,216,126 short ton units of tungsten had been purchased, with the program now 73.8 percent complete. The amount acquired during the third quarter had been 223,169 units, and the program was then 71.7 percent complete. If this average continues throughout the remainder of 1955 and 1956 with no change in the 3,000,000-unit goal, purchases will terminate on approximately August 30, 1956. If purchases are accelerated, they will terminate earlier.

This means that a strategic industry faces total shutdown in less than a year, says W. Lunsford Long, president of the Tungsten Institute. He reports that the domestic tungsten industry has undertaken a research program designed to stimulate new and increased uses for tungsten in an attempt to assure the industry's continued existence. Stanford Research Institute of Menlo Park, California will undertake the program under contract.



CONDENSOR PIPES and dust collector (right). The complete mercury recovery plant, from kiln to mercury bottling apparatus, was designed and supplied by Gordon I. Gould and Company of San Francisco, California.

RARE METALS' NEW MERCURY PLANT on the northwest end of Nutmeg Mountain. Picture was taken looking southwest from the "C" ore body. Open-pit mining is underway to left of furnacing plant.

PROSPECT AND BLAST HOLE DRILLING is done with this half-track mounted unit. A Jaeger compressor furnished air for the 4-inch Gardner Denver drifter. Prospect holes are drilled to 100-foot depth.

Rare Metals Makes History With...

.... World's Largest Rotary Kiln Furnacing Mercury Ores

.... First Heat Transfer Kiln and Waste Heat Recovery System

.... Only Plant Using Waste Heat To Pre-Dry and Heat Ore

.... Use of Automatic Double Soot-Hoeing Machine and Heated Hoeing Table

By GEORGE O. ARGALL, JR.
Editor

The fastest growing metal mining company in the United States—Rare Metals Corporation of America—has recently placed the world's largest rotary kiln furnacing mercury ores in operation at its Idaho-Almaden mine 15 miles east of Weiser, Idaho.

Only 18 months ago Rare Metals was a one-man operation—Mitchell H. Kline, now vice president and assistant general manager.

Here's what it is today. Rare Metals has proven over 300,000 tons of 4.0 pound mercury ore at the Idaho-Almaden, has developed 12 large 0.25 percent U_3O_8 ore bodies on the Navajo Indian Reservation in northeastern Arizona, is building an ore sampler and uranium mill there, and employs 150 people with supervision from the firm's new modern office in Salt Lake City, Utah.

Rare Metals is the mining subsidiary of El Paso Natural Gas Company and has caught the spark of the parent company for doing big things in a hurry. It is expansion minded, too, and has a busy crew of field geologists in the western part of the United States. Paul Kayser is president of both companies, and C. L. Perkins, vice president and general manager. J. J. Snider is in charge of the Idaho-Almaden operation.

Fast Schedule at Idaho-Alamden

You have to know a little about what and who Rare Metals is to fully comprehend just what has been accomplished at the Idaho-Almaden. It is impressive by any mining standard, and here are a few of the reasons why:

. . . STARTED TEST wagon and diamond drilling in November 1954.

. . . DISCOVERED ONE unknown ore body and proved large reserves in three others by March 1955.

. . . DESIGNED AND STARTED construction on June 6, 1955 of 175-ton-per-day furnacing plant.

. . . STRIPPED 100,000 tons of waste overburden off the top of three ore bodies by August 1, 1955.

. . . FURNACED FIRST ORE on September 15, 1955 with plant operating very satisfactorily at designed capacity since.

Discovery, Early Operations

In 1936 Harry Brown, an amateur mineralogist, was hunting for lost sheep on Nutmeg Mountain. Suddenly he saw reddish streaked rock at his horse's feet. He collected a sample and identified it as cinnabar. It wasn't until 1937 that he really became interested in the discovery, prospected the area extensively, staked 17 claims, and named it the Osa Anna mine for his mother.

In August 1938 the claims were leased to Lawrence K. Requa and Associates, who formed the Idaho-Almaden Mines Company. Early in 1939 the company built a 50-ton-per-day Gould furnacing plant, developed a shallow open-pit mine, and developed and mined an extensive series of veins through shallow shafts. The mine operated continuously under Requa's direction until late 1942 when it was closed, the plant and mine camp torn down, and moved away. It is interesting to note that the new 175-ton-plant is built partially over the top of the foundations of the earlier one.

WORLD'S LARGEST ROTARY mercury kiln at Rare Metals' Idaho-Almaden mine. Feed end is the far end, 90 feet away. The kiln is set on a ¾-inch-per-foot slope. Ore retention time is 45 minutes when furnacing 175 tons per day.

Geology of Deposit

Cinnabar occurs in sedimentary beds of the Payette formation (Miocene) near the crest of a long anticlinal structure. The beds have been impregnated and openings cemented with opal, calcedony, cinnabar, and pyrite. They were deposited at shallow depths from hot alkaline hydrothermal solutions rising through faults. The solutions spread outward through permeable sandstone beds beneath relatively impervious shale beds and deposited minerals at temperatures between 100 and 150° C. The mineralized rock contains about equal amounts of opal and calcedony, but local variations in content are common. Cinnabar occurs in the opal, calcedony, sandstone, and even in the overlying shale and clayey sandstone. Most of it, however, impregnates and replaces the opal and calcedony. It is generally very finely divided, so that it barely gives the rock a faint pinkish coloring. Individual veinlets of cinnabar in the higher grade sections are rarely over three millimeters wide.

All Exploration by Drilling

Rare Metals' engineers and geologists were so favorably impressed with the possibilities of finding additional ore at the Idaho-Almaden after their preliminary visits in the summer of 1954 that the corporation secured a lease and purchase option from Glen Brown and associates. Mr. Brown is one of the principal owners and a brother of Harry Brown, the discoverer of the mine.

Immediately thereafter an extensive exploration program of surface diamond drilling and wagon drilling was started. First drilling was done in the bottom of the Idaho-Almaden open pit. This was followed by drilling around the pit, with drilling of outlying mineralized areas following. This was generally done on a grid pattern with holes on 50-foot centers. Long hole wagon drilling proved to be much faster and cheaper than diamond drilling, so this was the principal method used. Dust samples were collected for each five-foot of hole drilled. Diamond drill holes were used to check the accuracy of the wagon drilling. A field laboratory was established at the mine to assay the samples. Accuracy of the field analyses was checked at the corporation's main laboratory in Salt Lake City.

The drilling program to date has comprised 451 wagon drill holes totalling 15,715 feet (average depth, 35 feet), and 68 diamond drill holes totalling 1,738 feet (average depth, 25 feet). Samples taken and assayed totalled 4,329.

This exploration program has proven 300,000 tons of 4.0 pound ore in four main ore bodies as follows:

"A" ORE BODY—This adjoins the Requa open pit south and southwest. The waste capping, 10 to 20 feet thick, has been stripped. Ore thickness reaches 40 feet in places. The ore here, as also in the "B" and "D"

TOPPING OFF THE CONDENSOR TOWER is watched by (left to right) Glen Brown, one of the mine owners; Mitchell H. Kline, vice president and assistant general manager; and J. J. Snider, superintendent of Idaho Almaden.

KEY MEN AT IDAHO-ALMADEN are (left to right): John R. Reynolds, superintendent Rare Metals' northern division, who directed exploration; J. J. Snider, superintendent Idaho-Almaden mine, who supervised construction; and Lee Hansen, office manager.

ore bodies, is primarily opalite with thin cinnabar films and veinlets. In many places the cinnabar is so finely disseminated that it imparts only a faint pinkish tint to the whitish-grey opalite. The ore zone is approximately 450 feet long and 350 feet wide. Ore will average 3.0 pounds of mercury per ton.

"B" ORE BODY—This is apparently a continuation of the "A" ore body but has been offset slightly and raised to a higher (25- to 40-foot) elevation. The ore averages 20 feet in thickness and was capped by 5 to 25 feet of waste. Ultimately, the open pit will extend in a southeast direction across the top of Nutmeg Mountain. Average grade is 3.0 pounds.

"C" ORE BODY—This has been only partially explored. It is on the western rim of the mountain south of the "D" ore body. The area is crossed by numerous stringers of high-grade ore. Many of these were mined by underground methods by Idaho-Almaden as the Sly Park Nos. 4 and 5 mines. There is no question but that some mercury will be recovered from this area. However, no tonnage or grade has been established.

"D" ORE BODY—This represents a new discovery because earlier prospecting failed to show any ore. It is on the extreme northern tip of Nutmeg Mountain northeast of the plant. It has been throughly drilled and sampled. Average grade is 5.0 pounds. Mining will be to a maximum depth of 35 feet.

ONLY ONE-STAGE CRUSHING is necessary on Idaho-Almaden ore. This 20- by 36-inch Kue Ken crusher is set at 3 inches. Capacity on the pit run ore is 50 tons per hour. The ore is abrasive but shatters easily in the crusher.

Low-Cost Mining

Mining is completely mechanized for low-cost production.

Waste overburden has been stripped from the "A," "B," and "D" ore bodies by contractors using Caterpillar D8's and Carryalls. Rare Metals does its own mining five days a week with the plant operating seven days.

All blast hole drilling is done with the same half-track-mounted wagon drill that was used during the exploration program. A Diesel-powered, 380-cubic-foot, Jaeger compressor is mounted on the half track. A four-inch Gardner Denver drill with an air feed motor is mounted on a 16-foot sash and carried on the starboard side of the half track. Holes can be positioned and aligned by changing the setting on the clamp which attaches the drill sash to the half track. Tungsten carbide bits are used and length of drill rod is extended to 100 feet or more, if desired, by adding additional lengths of steel and couplers. A machine man and helper operate the half track and drill.

All blast holes are located from assay maps. Each hole is drilled to predetermined depth, the half track moving from one hole to the next. Holes are spaced to fit rock conditions, are loaded with 40 percent dynamite, and blasted electrically.

The ore breaks well and shatters easily, both in pit blasting and in crushing. However, it is extremely sharp and abrasive, and cuts tires and wears the loader dipper lip very fast.

Eimco 105 Loads Ore

In the pits an Eimco 105 loader dumps three buckets to a five-ton Chevrolet dump truck. The trucks haul the ore to a Fairbanks Morse truck scale for weighing. Ore is then dumped directly into the primary bin or onto the concrete blending pad. This 80- by 80-foot slab is radiant-heated by hot water pumped from the furnacing plant's heat exchange boiler. The heated slab reduces the moisture content of the ore mined during winter months. This is impor-

tant because it keeps extra water vapor out of the condensing system and conserves B.t.u.'s for heating ore rather than water.

Ore from the pits is dumped into separate piles on the slab. A Michigan loader loads and transports proportionate amounts from each pile to maintain a uniform furnace feed.

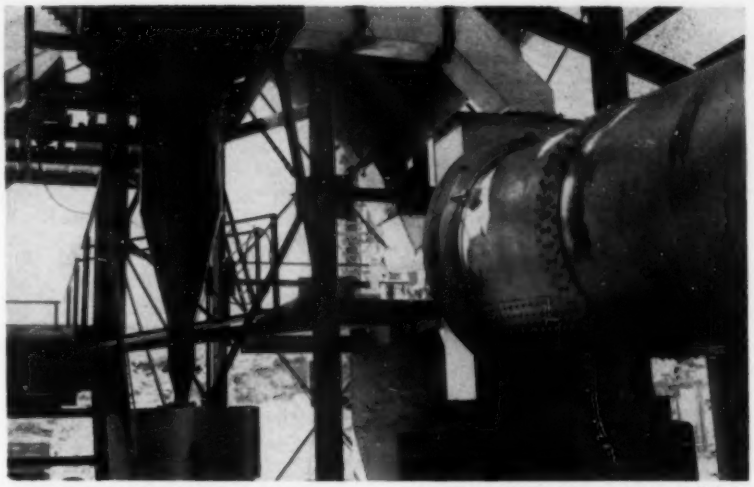
Only One-Stage Crushing

The primary ore bin has a sloping grizzly with 3-inch openings set along the bin bottom. Undersize passing the grizzly drops directly to the conveyor belt described below. Oversize is fed by a 30-inch Syntron vibrating feeder to a 20- by 36-inch Kue Ken crusher set at 3 inches. Crusher discharge drops to an 18-inch-wide conveyor belt 186 feet long extending to the top of the fine ore bin. Crusher and belt capacity is 50 tons per hour. The covered circular steel fine ore bin has a 250-ton capacity permitting three-shift furnacing and one of crushing.

Ore is drawn directly from this bin and charged to the kiln by a Gould reciprocating feeder. The six-foot-long column of ore in the feeder forms the gas seal at the feed end of the kiln.

Largest Rotary Kiln

The 5.5-foot in diameter by 90-foot in length Gould rotary kiln built by Gordon I. Gould and Company of San Francisco, California, is set at a slope of ¾-inch per foot. It rotates at 3.5 revolutions per minute to give a 45-minute ore retention time in the kiln.

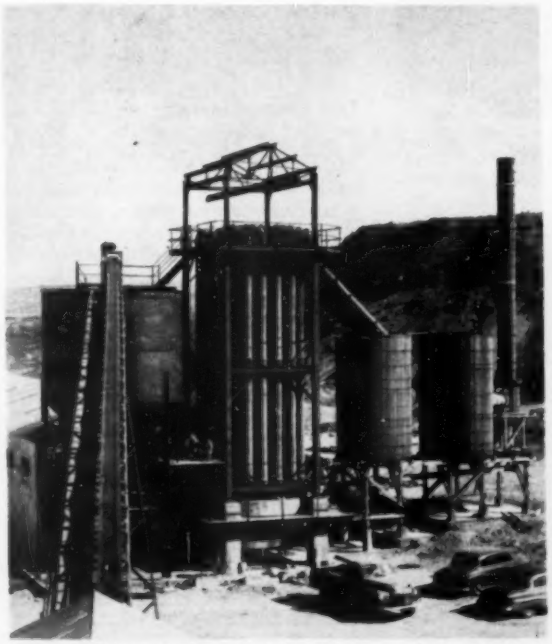


FEED END OF THE KILN showing square exhaust gas flue at top, and dust collector at left. The conical bottom of the 250-ton fine ore storage bin is below the flue with the Gould reciprocating feeder below the bin.

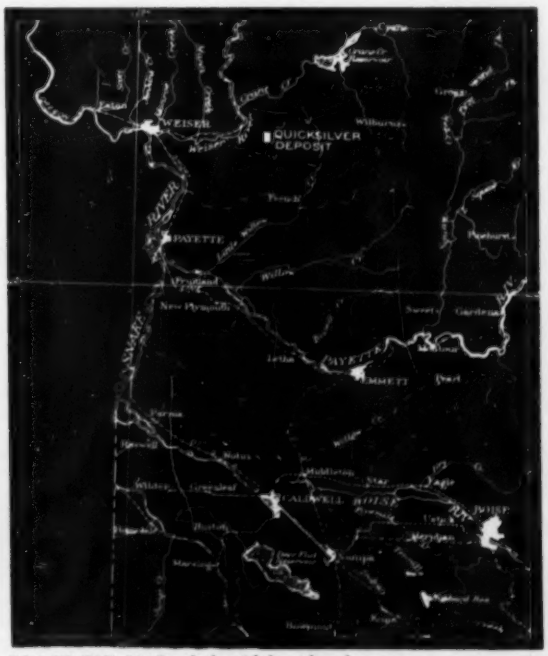
Ore flow is counter current to the heat flow. The kiln is heated by No. 6 bunker oil burned in a new type Hawk burner. Oil consumption is from 50 to 60 gallons per hour furnacing 175 tons of ore per day.

The burnt rock discharges to the cooler at temperatures from 1,200 to 1,400° F. As the rock is elevated to this temperature, the entrapped water and water of crystallization (about 3.0 gallons of water per minute is picked up in the dust collector) shatters the 3-inch rock to a fine powder.

The vaporized mercury, steam, and some dust at a 600° F. temperature are sucked out of the feed end of the kiln by a 5-foot Sirroco dust collector. The dust and condensed water form a mud which is drawn off the collector and the cleaned, mercury-laden gas goes on to the condensor



CONDENSOR TOWER rises above the new plant. The four-circuit condensing system has 36 pipes; each 18 inches in diameter and 36 feet long. Fine ore bin is at left and settling tanks at right.



PLACE-FIX MAP of the Idaho-Almaden mercury mine. The mine is reached by good automobile roads from Weiser 15 miles to the west. Geographically, the mine is several 10's of miles from any other metallic mineral deposit.

system. This consists of four circuits, each with nine pipes. These pipes are 18 inches in diameter and each is 36 feet long, made of two 18-foot sections.

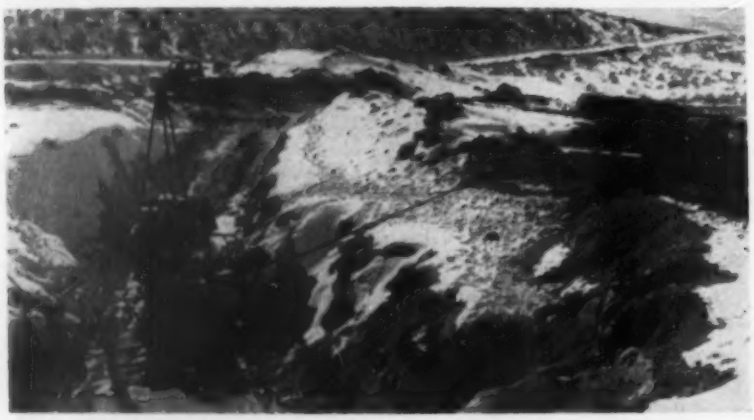
Cooled gas from the condensing system flows to two redwood settling tanks, in series, and discharges to the atmosphere through a redwood stack.

The condensed quicksilver goes through an automatic, double, soot-hoeing machine for cleaning before bottling.

Initially, the mercury is sold on the domestic market; however, El Paso Natural Gas will be an important user of Rare Metals mercury. At least $30,000 worth is used annually in mercury seals in natural gas pumping plants.

First Heat Transfer Kiln

The plant flowsheet incorporates the world's first heat transfer kiln and waste heat recovery system in a mercury furnacing plant. The hot calcine (burnt rock) from the vaporizing kiln, instead of being discarded as is the normal case in mercury plants, drops to a heat transfer kiln. This kiln is located on a lower floor of the plant so that the discharge from the upper kiln gravitates directly into the feed end of the lower kiln. It is 5.0 feet in diameter, 40 feet long, and is set on a ½-inch to one-foot slope. It is a rebuilt mercury furnace. The kiln discharges over the northwest slope of Nutmeg Mountain. Calcine disposal will never be a problem at the Idaho-Almaden as tens of thousands of tons can be dropped down the mountain side. Cool air enters the discharge end of the kiln, sweeps over the hot calcine, and leaves the feed end of the kiln as hot air which rises to the waste heat boiler on the upper floor. Initially, one half of the heated air is vented to atmosphere and the other half to the boiler where it raises the water temperature to boiling. This hot water is pumped to the hoeing table and to the ore drying slab.



DIAMOND DRILLING was started in the bottom of one of Idaho Almaden Mines Company's open pits shortly after Rare Metals took over the mine in November 1954. Since then 68 diamond drill holes and 451 wagon drill holes have been completed.

EIMCO 105 LOADER is used in the open pits. Three buckets fill one of the five-ton Chevrolet trucks. This picture shows the unit loading some of the first ore mined from the "A" ore body. Top of condensors visible at upper right.

How Plant is Built

The plant is fully mechanized with a central electric panel switch board with controls for all motors. This board also houses a series of recording temperature gauges which register the heat at kiln intake, kiln discharge, and the gas discharge temperature.

One man per shift, 21 shifts per week, operates the entire plant. As indicated earlier, mining is done on a five-shift basis and crushing on a one-shift basis six days per week. A mechanic, foreman, and clean-up man work the day shift only.

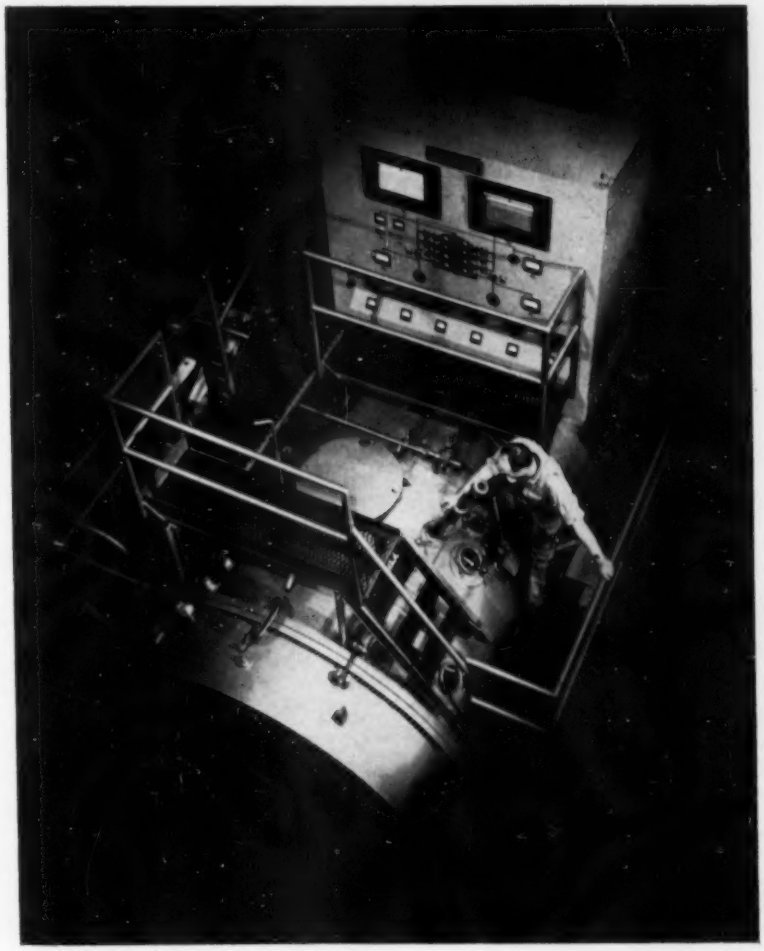
The kiln is housed in a steel framed building covered with galvanized iron. Plexolite skylights give good natural lighting during the daylight hours. A machine shop and garage occupy the east side of the building. It took 400 tons of steel to build the plant. The condensor pipes alone weigh 80 tons and are supported by 50 tons of structural steel. Foundations, condensor piers, floors, and footings required 700 cubic yards of reinforced concrete.

The Idaho Power Company built a four-mile, 13,000-volt transmission line to the mine to supply electric power. Water for the cooling tanks is pumped from company-owned wells at the foot of Nutmeg Mountain to a 50,000-gallon steel storage tank. Bunker fuel for the kiln is delivered by tank truck and stored in a 30,000-gallon tank.

Low Costs Assured

Without question, costs are low. Management hopes to make them lower so that the large reserve of 3.0 pound ore can be treated profitably. Narrow fissures of high-grade ore are known at depth below the open pits. They show promise for profitable underground mining. While not counted in ore reserve figures, there is no question but that some of them can be mined profitably.

Fuel cost is a major factor in determining grade of ore which can be furnaced. This, of course, will vary with the season of the year. One important factor to remember is that El Paso Natural Gas is in the fuel production and transfer business. Small flows of natural gas have already been discovered near the Idaho-Oregon boundary about 10 miles southwest of the mine. The mine itself is on the crest of a regional anticlinal structure. Don't be too surprised if low-cost natural gas will be the fuel in the future.



VACUUM MELTING substantially improves mechanical properties of most metals. This furnace holds 1,000 pound charge.

Meeting the Requirements For Pure Electronic Metals

By ROBERT J. ANDERSON

The need for high-purity metals, especially in electronics, grows more urgent as grades of domestic ore decline, scrap grows more complex, prices rise, increasing imports are required, and international tensions develop. It is important to the national economy that new ways be devised for purifying metals, or that existing methods be improved.

A comprehensive research program is needed where the economics of the available processes could be studied, as well as the feasibility of their application to large-scale production. The work might be concerned primarily with the refining or upgrading of relatively impure metals, or further investigation of methods for preparing high-purity metals. Both of these subjects are closely connected, of course.

The possibilities of simplifying complex methods and eliminating process steps should also be examined. Here, the object would be to attain an equivalent result at reduced cost. Also, a survey of methods for producing high-purity metals, starting with ores or other raw materials, may well be made.

Let's examine the work so far.

Commercial metals are commonly marketed in varying degrees of purity. The grade may depend upon the ore or other raw material from which derived, the method of extraction or processing, the refining, if any, and the metal itself. As a practical matter, metal grade is usually determined by the kind and amount of impurities present. Metals containing from 0.01 to 0.5 percent total metallic impurities are ordinarily regarded as relatively pure. However, the presence of small amounts—even traces—of impurities can markedly affect the properties of high-purity metals in various ways.

Mr. Anderson is head of the Department of Metallurgy at the Southwest Research Institute, San Antonio, Texas.

It is generally recognized that the desirable point of departure in alloy development work is the pure metal rather than one contaminated with a number of elements. The pure metal affords a set of fundamental values against which the intrinsic effects of alloying elements can be measured. Thus, metal containing less than 0.002 percent total impurities may be desired as a base.

Apart from the need for high-purity metals in alloy development, these metals are also required for various scientific purposes, and for particular applications in engineering. As a rule, high-purity metals are troublesome and costly to prepare. They are normally made available by special noncommercial methods of preparation or by expensive techniques of refining. Ordinarily, the operation is on a small scale. In general, the higher the purity, the greater the cost.

In addition to high-purity metals, there is demand for grades somewhat more pure than various commercial compositions. Or, expressed in another way, there is need for economical processes for up-grading impure metals and alloys, especially some derived from scrap. Among these, aluminum- and magnesium-base compositions may be mentioned.

Impurities in metals include other metals and also nonmetals. The nonmetallic contaminants may be solid compounds (as oxides, sulfides, and slags), or they may be gases. Also, both metallic and nonmetallic impurities may be dissolved in the metal or remain admixed with it.

Various refining processes or methods for decreasing the content of impurities in metals have been used in practice, tried, or suggested. The principal methods are the following: electrodeposition, fluxing and slagging, degassing, evaporation, oxidation, reduction, treatment of a liquid metal with other metals, liquation and crystallization, segregation, vacuum melting, zone melting, amalgam metallurgy, and filtering. These are discussed briefly below.

Electrodeposition

A relatively impure metal can be refined or purified by making it anode in a suitable aqueous bath and depositing as cathode from solution. Various impurities dissolve in the electrolyte or drop out as solids and appear as slime at the bottom of the bath. Electrolytic copper and electrolytic zinc are produced on a large commercial scale by this method. High-purity iron can be made by electrolysis of a suitable solution. In general, electrodeposition is suitable for the production of metals which must be comparatively low in impurities.

Fluxing And Slagging

Metals and alloys are treated in the fused condition with fluxes for the purpose of removing, or decreasing the content of, metallic or nonmetallic impurities including gases. Fluxes may be compounds of metals or nonmetals. A slag is the product formed by the action of a flux on nonmetallic components, oxidized metallic components, or other constituents in smelting or melting. Dross is a product, formed with or without fluxing, which appears at the surface of a melt. It may consist of oxidized metal plus separated impurities.

Aluminum can be removed from red brass by treatment with fluoride-bearing fluxes. Also, gas and oxide can be removed more or less effectively from aluminum by treatment with chloride fluxes. In basic open-hearth steel practice, a high lime slag is carried on the melt to remove manganese, phosphorus, and silicon as oxides.

Degassing

Contained gases can be eliminated quite completely by bubbling a suitable gas through a liquid metal. For example, hydrogen dissolved in aluminum can be expelled by passing nitrogen or chlorine. Suspended oxides and other nonmetallic impurities may be brought to the surface of a metal bath by the mechanical action caused by a bubbling gas. Also, the introduced gas may react with metallic impurities and thus effect refining. Degassing is sometimes classed with fluxing.

Evaporation

In the case of an alloy containing a metal of relatively low boiling point and another of high boiling point, the former may be decreased by heating above its boiling point. Thus, zinc can be driven out of a copper alloy by vaporization on heating above the boiling point of zinc, namely about 1,665° F. The boiling point of copper is given as 4,703° F. Evaporation may be conducted at atmospheric pressure or in vacuum.

Pure aluminum can be distilled from relatively impure metal by the subhalide process, covered by a recent patent. In this, aluminum chloride, $AlCl_3$ (boiling point approximately 360° F.), reacts with impure aluminum above red heat to form aluminum monochloride, AlCl. On cooling, the monochloride decomposes into aluminum and $AlCl_3$. The latter is recirculated.

Oxidation

Oxygen reacts with most metals as well as other elements. The rate or extent depends upon the particular metal and the conditions. This affords a basis for purification or refining. Impurities can be removed from metals by oxidation, using air, oxygen, or a reactive metal oxide (as in a slag). A familiar, if simplified, example is the removal of carbon from pig iron by blowing with oxygen or air in the Bessemer converter. In general steel making practice, the slag serves to regulate oxidation. The iron oxide in the slag oxidizes carbon, manganese, phosphorus, and silicon. In the cupellation of the lead assay button, the lead is preferentially oxidized while the gold and silver are left behind in the form of a bead.

Reduction

Oxidized impurities in metals can be reduced by the addition of suitable agents. The treatment is usually referred to as deoxidation, and the agents are called deoxidizers. In steel practice, the common deoxidizers are ferromanganese and ferrosilicon. Finishing deoxidizers include calcium silicide, ferrotitanium, and aluminum. Products of deoxidation may be slagged off or separated by gravity. In copper practice, the usual deoxidizers are charcoal and phosphorus. In producing tough-pitch copper, the excess cuprous oxide is reduced by covering the surface with charcoal and poling the bath with green wood poles. Nickel is deoxidized by silicon together with magnesium.

Treatment With Metals

Impure metals in the liquid state may be refined by adding other metals in controlled amounts. A well known example of this treatment is found in the Parkes process for the removal of silver and gold from lead. At a particular stage in this process, a small quantity of zinc (1 to 2 percent) is added to the fused lead alloy. Silver and gold leave the lead and join the zinc. The resulting high zinc material rises to the surface and is skimmed off.

The sulphur content of steels can be markedly reduced by suitable additions of 50:50 aluminum-magnesium alloy. It has been recently reported that iron, silicon, aluminum, and manganese can be separated from magnesium melts by addition of zirconium and the residual zirconium removed by gassing.

Liquation And Crystallization

When an alloy is partly melted or raised to a temperature between the solidus and liquidus, the more fusible portion can be drained away. Accord-

ingly, a separation of constituents can be effected. This principle applies to alloys in general. Conversely, if the temperature of a liquid alloy is lowered to a point between the liquidus and the solidus, the less fusible portion will crystallize out. The Pattinson process for the desilverization of lead, now seldom used, was based on this action. Sweating out is a liquation where, on heating, small beads of a constituent appear on the surface of an alloy.

Gravity Segregation

When an alloy melt is held in the liquid state for a relatively long time, the heavier constituents tend to increase in concentration at the bottom of the bath. The concentration is the more pronounced the greater the difference in density of the components. In metal practice, the effect is usually called gravity segregation. It is promoted by having the liquid alloy stand quietly at suitable temperature. Gravity segregation is especially noticeable in the case of metals which are largely immiscible in the liquid state. It may be practiced to advantage for some compositions, as for decreasing the lead content of copper-base alloys. Likewise, copper may be removed from lead by gravity segregation, the copper rising to the surface of the melt.

Vacuum Melting

Up to now, the primary purpose in the vacuum melting of metals has been to remove dissolved gases or prevent interaction with gases. At the same time, metallic impurities can be removed from metal melts by vacuum distillation. In any case, vacuum melting yields metal with properties quite different than those afforded by melting in ordinary furnace atmospheres. In general, most mechanical properties are substantially improved by vacuum melting, including tensile strength, stress rupture, impact resistance, and fatigue life. By vacuum melting, antimony can be removed from lead and magnesium from aluminum; zinc can be removed from lead, silver, and aluminum alloys.

Zone Melting

In zone melting, a bar of metal is melted progressively and slowly from one end to the other. Impurities which are soluble in theliquid metal become concentrated in the liquid zone as the melted basis metal freezes. The end of the bar last frozen is cut off and discarded. Melting is done by induction heating, and the metal may be placed in a boat or act as its own container. A bar may be passed repeatedly for increased refining, and melting may be done in vacuum or in special atmospheres. The process of zone melting was recently developed for the special purpose of preparing high-purity germanium for use in transistors. However, it has also been applied for refining other metals to unheard of degrees of purity.

INTERIOR VIEW of vacuum melting furnace. Use of this type unit prevents interaction with gases during melts. Dissolved gases are also removed. The result is a pure metal with higher tensile strength, greater impact resistance, and longer life.

Amalgam Metallurgy

The utilization of amalgamated copper plates in the extractive metallurgy of gold and silver is old. However, the concept of amalgam metallurgy in the purification of metals is rather new. It is based on German work described principally by H. Hohn[1]. Amalgam metallurgy is concerned with treating ores or impure metals with mercury, thereby producing amalgams. Depending on circumstances, high-purity metals may be recovered from the amalgams by distillation of the mercury, electrolysis, or treatment with suitable aqueous solutions. Mr. Hohn has discussed several applications of amalgam metallurgy. One covers the processing of zinc-alloy die-casting scrap for the recovery of zinc and of the alloying metals. In the operation, the zinc is converted to a zinc amalgam. This is made anode in a zinc sulfate solution, and the zinc is deposited by electrolysis on aluminum cathodes. The resulting zinc is said to be extremely pure.

Filtering

Although filtration is a common method of separation in chemical technology, it is most unusual in metallurgy. The principle of applying filtration methods in metallurgy has been covered in French patent 848,375 of 1938. As reported by Mr. Hohn, among other possibilities this patent "proposed the use of molten lead, molten zinc, and mercury as solvents for the extraction by selective dissolution of individual components from metallic systems." This filtering principle has been tried in connection with the amalgam processing of aluminum-base compositions for the production of high-purity aluminum. A ceramic filter was used to prevent the passage of substances insoluble in the mercury. Of course, the perforated skimmer used generally in metal-melting practice is a crude type of filter.

These then are the basic methods for metal purification, along with new processes developed or tried within recent years. The need definitely exists for high-purity metals and for upgrading relatively impure metals. Research becomes more urgent as the uses for high-purity metals continue to increase.

[1] Research, Vol. 3, No. 1, 1950, pp. 16-23; and No. 9, pp. 407-417.

What the Monarch Shaft Is and How Equipped

Monarch shaft with hoist house and waste chutes.

Interior view of hoist house showing main hoist.

SHAFT NAME: Monarch.
SHAFT SHAPE: rectangular.
SHAFT SIZE: 12 by 20 feet excavated, 10.5 by 18 feet inside timber.
SHAFT COMPARTMENTS: two for hoisting and one for service.
SHAFT USE: downcast for ventilation.
SHAFT COST: estimated to be £505,000.
ULTIMATE DEPTH: 3,410 feet.
SHAFT LINING: fully timbered; sets on 7.5-foot vertical centers. No concrete lining will be used.
HEADFRAME: 6-leg, steel, box-girder type.
MAIN HOIST: double-drum with maximum rope speed of 2,350 feet per minute.
MAIN HOIST MOTORS: two 900-horsepower AC motors with DC dynamic braking.
SERVICE HOIST: single-drum with maximum rope speed of 500 feet per minute.
SERVICE HOIST MOTOR: one 234-horsepower motor with stator-reversing.
SINKING SKIPS: two 3-ton sinking skips.
PERMANENT SKIPS: two 4-ton tipping skips interchangeable with two double-deck cages.
SERVICE CAGE: skeleton cage with five decks.
ORE BIN: skips will dump into chutes discharging into a 1,500-ton storage bin which is not part of headframe.
ORE TRANSFER: ore will be drawn from bottom of storage bin into 14-ton side dump cars and hauled to mill by 15-ton trolley locomotives.
WASTE BIN: skips will dump waste rock into a surge bin from which it is drawn off by a belt conveyor loading a storage bin; Then trammed to waste dump from storage bin.

South Africans Do It Again: Sink

Martin J. Tucker, master sinker, and his crew in September 1955 established the astounding new monthly world shaft sinking record of 763 feet in the Monarch shaft of West Rand Consolidated Mines, Ltd., near Krugersdorp, Union of South Africa.

Together with some members of the same crew, in 1951 he also set the record for that time in the No. 3 shaft of the Virginia Orange Free State Gold Mining Company, Ltd. with a monthly advance of 504 feet. See MINING WORLD, June 1951, pages 34, 35, and 36 for a full report on that record. Understandably, the new record adds further luster to the already rich tradition of outstanding shaft sinking which has become characteristic of the South African mining industry. In a little over four years, highest monthly footage has increased 259 feet—from 504 to 763. Since 1951, the record has been advanced five times, and in 1955 alone two world records were set.

In reporting on the record, Mr. Tucker told the MINING WORLD correspondent present at the mine when the record was set that the new achievement was due to "intensive organization and team work; careful attention to detail, planned storing, and movement of materials on and near the bank, and—above all—the unfailing and unflinching cooperation of the crew and mine staff. I mostly bellowed out the orders, and the crew down the shaft carried them out."

Tributes to Mr. Tucker and the crew of Europeans and Basutos were paid by Sir George Albu, chairman of General Mining and Finance Corporation Ltd.; C. S. McLean, deputy-chairman and technical director; and E. M. Stewart, general manager of the mine, immediately after the record was set.

West Rand Consolidated Mines Ltd., administered by General Mining and Finance Corporation Ltd., is situated on the West Rand in the Southern Transvaal, south of the town of Krugersdorp. The mining area extends over 2,321 claims.

How Many Men Used

Supervision

One master sinker.
One shaft foreman.
One timberman foreman.

Shaft Crew Per Cycle

One sinker.
One sinker helper.
Equivalent of 2.4 timbermen.
Fourteen drillers.
Twenty-six muckers.
Two equippers.

Surface Crew Per Shift

One pipefitter.
One electrician.
One boilermaker.
One set-maker.
One top man.
Twelve top helpers.
Seven rock disposal men.
Two hoistmen (per cycle).

These Machines and Methods Set Record

Equipment

PERMANENT HEADFRAME: erected and used for sinking.

HOISTS: permanent hoists installed. Only one 900-horsepower motor used for sinking. It is air cooled by forced ventilation.

ROPE SPEED: maximum hoisting speed at present depth is 2,000 feet per minute.

SERVICE COLUMNS: the shaft is timbered and three service columns (electric power, water, and compressed air), and ventilation duct installed.

VENTILATION DUCT: 22 inches in diameter. Through it 10,500 cubic feet of air delivered per minute to shaft bottom.

AIR FAN: fixed bladed fan on surface connected to flow-reversing duct with control by gate shutter valves.

STANDBY POWER: on surface a Diesel-electric generation set is available in event of power failure.

ROCK DRILLS: 3-inch jackhammers.

DRILL STEEL AND BITS: integral steel with chisel-type tungsten carbide bits.

Methods

SHAFT COLLARED: July 25, 1955.

DEPTH SEPTEMBER 1ST: 948 feet.

DEPTH SEPTEMBER 30TH: 1,711 feet.

SINKING ROUND: 78 holes, wedge cut, each hole about 6 feet deep.

ELECTRIC CAPS: Nos. 0 to 8 delays, detonated from surface.

Native muckers entering man cage at shaft collar.

ROCK BROKEN: about 120 tons per round, 20.2 tons per foot.

BOTTOM VENTILATION: fan exhausts immediately after blasting; when fumes cleared, switched to forced ventilation.

PILOT HOLES: not drilled ahead, shaft is being sunk in dry ground.

SERVICE COMPARTMENT: used for all equipment; timber slung and lowered under skeleton cage.

DRILLING WATER CONTROL: by a series of valves in column down the shaft. Close control maintained to prevent use too much water. Control by signalling from shaft bottom.

763 Feet In 30 Days For Record

In ascending order of depth, the following reefs are mined by the company. The Main Reef group is represented by the Main and South Reefs, the depths ranging from outcrop to about 6,000 feet. The Livingston Reef ranges from surface to about 2,500 feet. The Bird Reef group represented by the White, the Monarch, and two zones of the Upper Monarch reefs, ranges in depth from outcrop to about 4,000 feet. The Kimberley Reef group, represented by the Battery Reef, ranges from surface to about 3,000 feet. All these horizons are typical conglomerates of the Witwatersrand Series, separated in varying degrees by quartzite and shale.

The formations traversed during the record-breaking month were quartzite and Kimberley shale.

All the reefs are mined for their gold and silver only, except the Bird Reefs, which are mined essentially for their uranium; with gold and silver as byproducts.

The various horizons are presently served by six shaft systems: the East, West, Rand, Flora, South, and Deep. These handle about 10,250 tons per 24 hours. In the Deep Shaft—a six-compartment, rectangular unit; the internal dimensions of each compartment being 5 by 10 feet—monthly sinking advances of 441 and 454 feet were achieved. Both of these constituted new records for all types of shafts in 1940. Martin J. Tucker was a timberman in the crew that established the 1940 record of 454 feet; other members of that crew who are also in the crew now sinking the Monarch shaft are C. W. Smart, shaft foreman; J. J. van der Walt, timber-

Time and Material Summary

FOUR CYCLES: 6-hours each per 24-hours. Average during September was 5 hours and 23 minutes each.

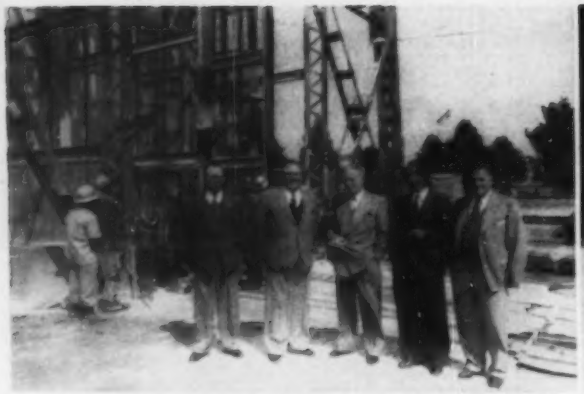
REENTRY PERIOD: 30 minutes.

EQUIPPING AND MUCKING: 2 hours and 40 minutes.

BLOWING-OVER: 35 minutes.

DRILLING: 30 minutes (About 1,000 gallons of drilling water per round are cleared from shaft bottom).

ROCK BROKEN, tons:	14,680 (September)	68,200 (Complete shaft)
TIMBER, cubic feet:	6,050	27,900
TIMBER, tons:	188.7	869.6
POWDER, tons:	14.6 (60%)	74.25
ELECTRIC CAPS:	10,218	47,892
FEET DRILL HOLE, per foot sunk	83	83
DRILL HOLE, total feet:	6,922	283,030
SKIP TRAVEL, miles:	4,161	



MEN WHO MADE THE RECORD, at left are J. J. van der Walt, timber foreman; M. J. Tucker, master sinker; E. M. Stewart, general manager; G. W. Morris, assistant general manager; and C. W. Smart, shaft foreman. At right the managerial staff and key sinking personnel pose for their picture after setting the new sinking record.

man foreman; and J. P. Potgieter, timberman.

The Flora and Rand Shafts to a major extent, and to a less extent, the South Shaft, have been employed to open up and mine the Bird Reefs. This meant the virtual suspension of operations on the Battery Reef. It became necessary to sink a new shaft, the Monarch, in the southwestern section for a number of reasons: to avoid any further extension of already lengthy underground haulages through the crosscuts to the Bird Reefs; to provide for the expansion of operations on the latter and thereby supply the greater tonnages required for treatment in the extended uranium and associated reduction plants; and to effect greater facilities for and economies in the underground movement of personnel, materials and ore.

Another West Rand Record

West Rand Consolidated also holds the record for being the first South African uranium producer. On October 8, 1952 the new uranium recovery plant was commissioned and subsequently fully described in the December 1952 issue of MINING WORLD, pages 36 and 37.

Acknowledgement is made and thanks extended to the head office of General Mining and Finance Corporation Ltd., and to the management and staff of West Rand Consolidated Mines Ltd. for inviting MINING WORLD's correspondent to be at the mine when the new shaft record was established.

World's Sinking Records For Round and Rectangular Shafts In One Month's Time

Mining Company and Shaft	*Location*	*Feet Sunk*	*Month, Year*	*Type*	*Size*	*Formation Penetrated*	*Lining*
West Rand Consolidated Mines, Ltd. Monarch	Krugersdrop, Transvaal, South Africa	763[1]	September 1955 (30 Days)	Rectangular	20 by 12 feet excavated	Witwatersrand Quartzite, Kimberley shale	Timber sets
Vaal Reefs Exploration and Mining Co., Ltd. No. 1 Ventilation	Klerksdrop, Transvaal, South Africa	667	March 1955 (31 Days)	Circular	20-foot-diameter, excavated. 18-foot lined	Quartzite and shale	Concrete
Merrisepruit Orange Free State Gold Mining Co., Ltd. No. 2	Virginia, Orange Free State, South Africa	597[2]	June 1954 (30 Days)	Circular	Four compartments, 26.5 feet excavated 24.5 feet lined	Quartzite and shale	Concrete
Vlakfontein Gold Mining Co., Ltd. No. 2	Heidelberg, Transvaal, South Africa	585[2]	May 1953 (31 Days)	Circular	for downcast ventilation, 26.5 feet excavated 24.5 feet lined	Quartzite and shale	Concrete
Hartebeestfontein Gold Mining Co., Ltd. No. 2	Klerksdrop, Transvaal, South Africa	518[1]	May 1954 (31 Days)	Circular	Four compartments, 23.0 feet excavated 21.0 feet lined	Quartzite and shale	Concrete
Virginia Orange Free State Gold Mining Co., Ltd. No. 3 Shaft.	Virginia, Orange Free State, South Africa	504.0	April 1951 (30 Days)[3]	Circular	24-foot diameter 26.5-foot excavated	Karroo shales	Quick setting concrete
Virginia Orange Free State Gold Mining Co., Ltd. No. 3 Shaft.	Virginia, Orange Free State, South Africa	470.0	March 1951 (31 Days)	Circular	24-foot diameter	Karroo shales	Concrete
Van Dyk Consolidated Mines, Ltd. Ventilation Shaft.	Far East Rand, Union of South Africa.	461.0	August 1941 (31 Days)	Circular (Cecilia type)	15-to 16-foot Diameter as sunk. 14-foot lined.	Witwatersrand Quartzite	Unlined as sunk
West Rand Consolidated Mines, Ltd.[1,2]	Western corner Witwatersrand, Union of South Africa.	454.0	May 1940 (31 Days)	Rectangular	6 compartment 37.5 by 13.5 excavated	Quartzite and shales	Timber lined
Water Lilley Shaft.	Eureka, Nevada.	427.5	September 1920 (30 Days)	Rectangular	Three Compartment. 5.75 by 15.5	Porphyry and Limestone	Timber sets
Crown Mines, Ltd. No. 18 Shaft.	Outskirts of Johannesburg, Central Rand, Union of South Africa.	390.0	July 1935 (31 Days)	Circular	19.6-foot Rock section.	Quartzite and shales	Timber sets

1. Concurrent sinking and equipping.
2. Mechanical mucking by air-operated grabs.
3. Actually 29 working days due to lost time in replacing one electric hoist with a steam-driven hoist.

CALIFORNIA GOVERNOR Goodwin J. Knight calls for united action as he speaks to delegates at Minerals Conference.

Governors' Council Recommends Tariffs

More tariffs and higher tariffs on metals and minerals are needed now to restore and maintain a healthy domestic mining industry. These are the recommendations of both the Western Governors' Mineral Policy Conference and the Western Governor's Mining Advisory Council. They were drafted and adopted for presentation to the Western Governors at Sacramento California during conferences of the two groups held November 7-9.

California Governor Goodwin J. Knight, vitally concerned with the mining industry, called the Conference and announced its object as follows, "The formulation of national mineral policy recommendations aimed at developing and maintaining a healthy mineral industry in the western United States."

At the invitation of Governor Knight 500 western miners and Governors Smylie of Idaho, Simpson of Wyoming, Russell of Nevada, Lee of Utah; and Lieutenant Governor McNicolas of Colorado attended the conference.

Conference co-chairmen Dewitt Nelson, director of the California Department of Natural Resources and Sam. H. Williston, vice president of Cordero Mining Company, arranged a five subject agenda. Considered were: taxes, lands and water, mineral economics, research, and public information. The mineral economics section was broken down into: aggregates, antimony, asbestos, cement, clay, chrome, coal, copper, fluorspar, gold, lead-zinc-silver, manganese, molybdenum, phosphate, potash, quicksilver, rare earths-thorium, and uranium-vanadium. Session chairmen had been appointed by the conference chairmen.

As was to be expected the greatest attendance was at the commodity meetings. Many hope that the gold session is a portent of things to come because there were three times as many miners interested in the gold meeting as there were in the adjoining uranium meeting. Geography undoubtedly played an important part in this, because California is the Golden State and the meetings were held only a few tens of miles from the location of John Marshall's famed discovery.

Specific Tariff Recommendations

The conference as a whole made specific recommendations to the advisory council which then modified, where necessary, and passed the recommendations on to the Western Governors for their consideration. Most universal recommendation was for tariffs. Details of the council's tariff and excise stands follow.

Antimony—Ore and concentrate, at least 15 and possibly 71.5 cents per pound on contained antimony. Smelter products, at least 30 and possibly 35 cents per pound.

Chromite—A rate of 100 per cent on imports or 10 per cent or equal to ¾ cent per pound on contained chromium.

Copper—Maintain present import tax.

Lead and zinc—Excise tax of 2.0 cents per pound of imports when price of zinc falls below 14 cents East, St. Louis, and lead below 16 cents, New York.

Manganese—On July 1, 1958 tariff of 5 cents per pound of contained manganese on imports, or 0.5 cents per pound with receipts distributed to domestic producers in accordance with their output.

Mercury—About 33 per cent to be based on selling price in relation to price when present tariff set.

Molybdenum—Possibility of a reduction to no less than 50 per cent of existing figure.

Tungsten—An adequate tariff to enable domestic industry to stand on own feet and compete with low cost foreign producers.

Rare earths and thorium—recommend $100.00 per ton based on 60 per cent rare earth concentrate.

The conference and council both asked legislation for a free market for all newly mined gold and to prevent the Treasury Department from selling monetary reserve gold to private industry. The silver recommendation was for Congressional rejection of Senate Bill 1427.

TECHNICAL SESSIONS were held upstairs in this old style gambling casino; day and night gambling continued below.

Las Vegas Treatment Suits Miners

Las Vegas, gambling mecca of today's west, played host in October to undoubtedly the largest single group of gamblers (of another variety) ever to visit the city. This came about with the annual American Mining Congress convention.

The miners and machinery men were not distracted by the glamour and glitter of Las Vegas, as convention business was carried out in a sober and workmanlike manner.

Some of the delegates attending the convention experienced disappointments. These were the uranium producers awaiting some word by the AEC regarding government policy toward uranium after the present buying program is over in 1962. No announcement was forthcoming.

Others had a chance to relax, greet old friends, and see what associates in the industry were doing.

The technical sessions were all well attended and much newly acquired information was carried home by the attending delegates.

Airlegs Versus Jumbos

What has been the experience of Tri-State operators using airlegs? S. S. Clarke, former superintendent of the Tri-State Mines Division of The Eagle Picher Company, reports that the airleg has a definite place in the company's "Dieselized" mines. Most of the drilling is done with jumbos, but the airleg is a good general purpose machine for prospecting, driving raises, widening drifts, and mining low-head room, upper mineralized beds, that were inaccessible to or uneconomical for conventional jumbos.

At Kerr-Addison Gold Mines in Northern Ontario, Canada, manager J. L. Ramsell said the introduction of airleg drilling in horizontal development work has resulted in a daily increase in advance for a given heading of from 8.5 to 14.8 feet.

Yieldable steel arch sets generated a good share of interest at the drilling and roof support session. These sets are replacing concrete lined slusher drifts at Bethlehem Cornwall Corporation at a saving of nearly $3.00 per linear foot, according to R. W. Sleeman, chief mining engineer.

Nevada Mines Division, Kennecott Copper Corporation, is closely examining the yieldable arch set. A complete change in mining plans from branch raises to slusher drifts is anticipated at the Deep Ruth mine if experiments with these sets in the Minnesota Hi-Ore Body prove satisfactory.

New Mining Machines

Under the chairmanship of A. C. Bigley, the Anaconda Company's general manager of western mining operations, the meeting on improved mining methods got underway with a sparkling description of four new machines.

Consulting engineer Roger V. Pierce's talk covered the Cryderman shaft mucker for use in inclined and vertical shafts; a large, hydraulically controlled rotary drill for boring 6-foot diameter holes for mine shaft service; San Francisco Chemical Company's multiple train car loader for drift work, a unit that allows the full 50-ton round to be mucked into cars without switching a single car; and a large rotary continuous miner for drilling water level tunnels or drift openings.

Exploration and Geology

Four major discoveries, including two exceeding 25,000,000 tons, have been made since the Fall of 1952 by ground and airborne electromagnetic methods. These discoveries in the Bathurst-Newcastle area of New Brunswick, Canada, were described by Harold O. Seigel, consultant from Toronto, Canada.

The general approach to prospecting has been to employ electrical methods for primary detection of conducting zones. This is followed up by geochemical soil sampling and gravimeter traverses to determine which of the conductors are caused by graphite and which by sulphide mineralization. The former outnumber the latter by more than 100 to 1.

Mechanized Mines

Successful adaptation of machinery and equipment now used in operations from low-seam bituminous coal mines to low-seam uranium mines is resulting in increased production and greater efficiency. In his discussion,

Harold Spencer, president, Centennial Development Company, Eureka, Utah, stressed the above point, as he gave a complete description of mechanization in uranium mines on the Colorado Plateau.

Cyclone Discussion

Discussion of cyclones dominated the Monday afternoon meeting on milling and metallurgy. It was reported that better separation resulted in increased grinding efficiencies in most cases. At Manganese Inc., general superintendent, S. J. McCarroll, described the use of eight 12-inch cyclones in the grinding circuit. In classifying manganese ore containing bentonite, cyclones showed advantages over mechanical settling type classifiers.

Phelps Dodge Corporation supervisors, who include L. M. Barker manager, J. E. Papin, concentrator superintendent, and R. C. Barr, metallurgist, all at the Morenci Branch, said that cyclones are being used both in the grinding and regrinding circuit. More efficient grinding has been obtained, but wear both on the cyclone and on pump parts remains a problem. The Morenci concentrator can now do the same job with 2.2 grinding mill shifts as opposed to a required 3.8 grinding mill shifts before the installation of cyclones.

E. C. Herkenhoff, a Pickands Mather & Company metallurgist, presented a good description of control systems which enable operators to control the separation of cyclones. In addition to the normal controls such as feed dilution, variation in apex openings or adjustment of vortex finders, he went into the application of variable speed drive feed pumps.

Radon Control

Otto A. Weisley, chairman, Utah State Industrial Commission, discussed parts of the Utah Workmen's Compensation Act. He stated that an entire uranium mine cannot be made absolutely safe; however the state has proven that a good ventilating system can make the actual working places reasonably safe.

He went on to say that mine operators must monitor the concentration of radon and its immediate daughters, at their own expense, to a prescribed working level set by the state.

Uranium Discussion

A panel discussion regarding the latest trends in uranium prospecting was conducted by Phillip L. Merritt, geologist with E. J. Longyear Company.

Trips Climax Convention

THE TOPIC OF DISCUSSION is the plant of Manganese, Inc. by interested delegates and company representatives during convention visit.

A visit to two chemical plants at Henderson, Nevada and the nearby operations of Manganese, Inc. started the field trips, held on the last day of the convention. Delegates inspected the Three Kids open-pit mine, where they observed both stripping and mining operations. They were able to follow the flow of manganese ore from the pit through the crushing plant, flotation mill, and kilns, and finally saw the finished product of metallurgical grade nodules. After a Welcome Lunch delegates went on to observe the operations of the Western Electrochemical Company and the U.S. Lime Products Corporation plant, at the site of the immense wartime Basic Magnesium plant.

A second field trip provided for convention delegates was to the Mountain Pass, California property of Molybdenum Corporation of America, 60 miles southwest of Las Vegas. Visitors had an opportunity to inspect one of the world's greatest rare earth bonanzas, which was discovered in 1949. A smorgasbord lunch was provided by the host company; then small groups dispersed to visit mining sites and the unusual milling operation. Molybdenum Corporation of America is currently concentrating 160 tones of ore and producing a 90 percent rare earth oxide by flotation, leaching, and roasting leached residue.

CONVENTION DELEGATES INSPECT the electrolytic precipitation of sodium perchlorate at Western Electrochemical Company's Henderson plant.

TIME OUT FOR A SNAPSHOT was taken by (left to right): S. L. Evans, vice president, Galigher Co.; H. L. Lange, vice president, Galigher Co.; and F. R. McQuistin, chief metallurgist, Newmont Mining Corporation.

Among the items discussed were a theory on the deposition of uranium and descriptions of the latest prospecting methods used on the Colorado Plateau.

It was brought out that although the days of the surface prospector with a Geiger counter are not over, much exploration thinking has turned to the possibility of locating deep seated ore bodies. These ore bodies are believed to be present; however, they are out of the range of detection by radiation instruments.

A summary of domestic uranium activities was made by Sheldon P. Wimpfen, manager, Grand Junction Operations Office of the AEC. Mr. Wimpfen stated that the uranium industry has come of age, with private industry carrying the ball and the government acting as a partner. Further statements by Mr. Wimpfen indicated that at the present time the country has a plentiful supply of uranium ore, however all of it, and more, will be needed.

Uranium Outlook

The last uranium session, and perhaps the one most eagerly awaited, was the meeting on AEC policies and the outlook for the uranium industry. Overflowing attendance at the meeting gave evidence to the amount of interest displayed. It was thought that perhaps some formal statement from the AEC would be forthcoming regarding the future of the industry. Much to everyone's disappointment, this was not the case.

Burt B. Brewster, editor and publisher of *Mining and Contracting Review*, Salt Lake City, Utah, stated that private financing of uranium ventures has been dropping off due to the insecure future of uranium after 1962. Along this line of thought, G. R. Kennedy, representative of Kerr-McGee Oil Industries, Inc., stated "It is high time that the AEC exchanged a few secrets with the poor uranium miner."

Outsider's Guess

An outsider's estimate on the future of uranium consumption was made by A. J. Eardley, dean, College of Mines, University of Utah. By utilizing a system of guesses and estimates, Dean Eardley concluded that much more uranium will accumulate in the next 10 years than the United States will be able to use. This added rather a discouraging note to the session; however, Dean Eardley emphasized the fact that this was only an outsider's estimate.

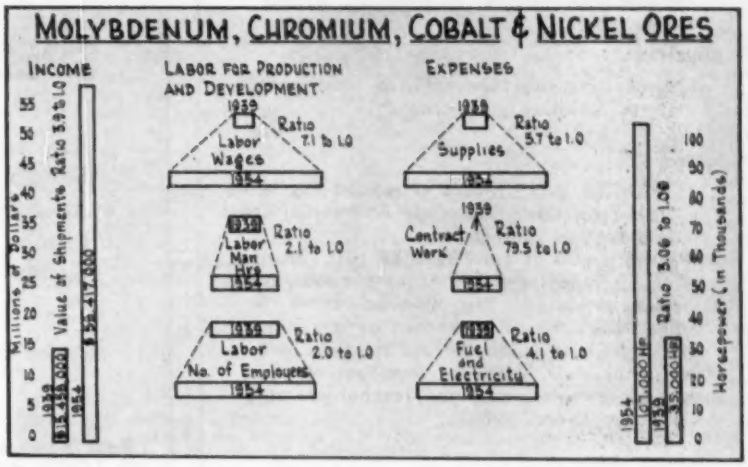
Senator Clinton P. Anderson, Chairman of the Joint Senate-House Committee on Atomic Energy, gave a talk on progress in atomic energy and policies needed to maintain a strong domestic uranium industry. Senator Anderson made several predications as to the future. He thought that uranium consumption due to military needs, power for increased population, and new uses of the metal would continue to increase. A bright picture for the future of the industry was painted by Senator Anderson; however, he urged the AEC to announce, as soon as possible, just how long it will continue buying uranium, and at what price. Such a statement would do much to relieve the present concern of the uranium miners and prospectors.

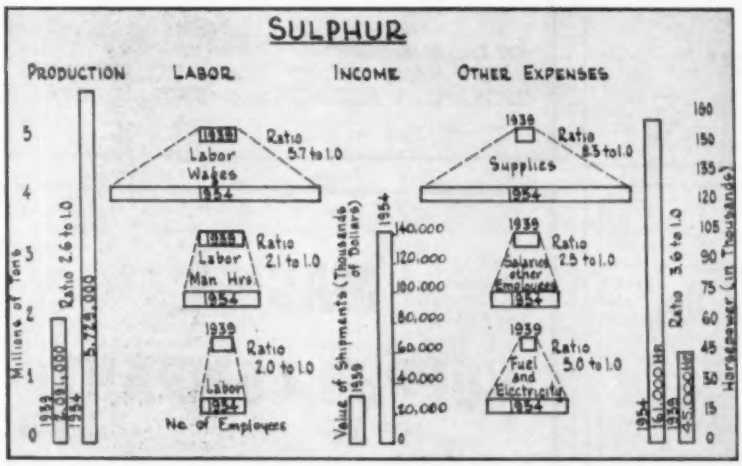
DISCUSSING THE COURSE OF THE CONVENTION are (left to right): Tom Evans, chief mining engineer, and Bill Crutchfield, mining engineer, both with Santa Fe Railway Co.; Del Peterson, director, Airborne Division, Engineers Syndicate, Ltd.; E. H. Crabtree, director, Colorado School of Mines Research Foundation, Inc.; C. E. Prior, consulting engineer; and F. C. Blickensderfer, chief metallurgist, Mohave Mining and Milling Company.

Preliminary Report
1954 Census of U.S. Mineral Industries

Statistics for Primary Producers of Mo, Cr, Co, and Ni Ores

Value of shipments	$59,417,000
Total Employees	2,288,000
Labor (Number)*	1,898
Other employees	390
Man hours, labor	4,428,000
Principal expenses (Total)	$28,194,000
Wages of labor*	$10,384,000
Salaries	$2,619,000
Supplies	$9,751,000
Purchased electric energy	$1,300,000
Contract work	$3,335,000
Purchased machinery installed	$2,340,000
Capital expenditures	$5,472,000
Horsepower rating of power equipment	107,000



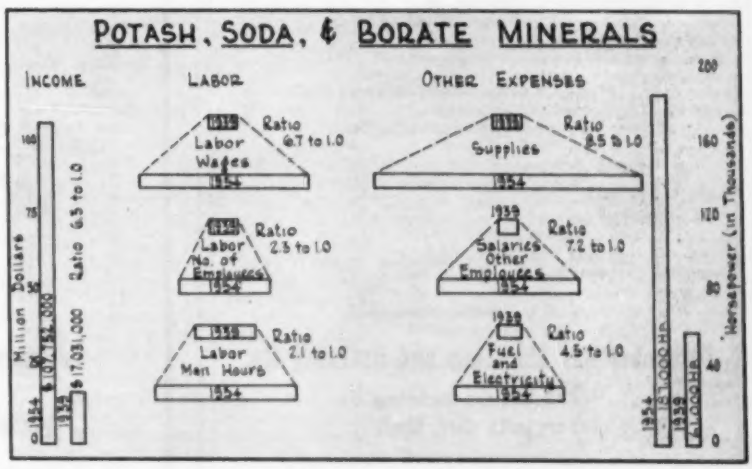


Statistics of Sulphur Industry

Value of shipments	$140,685,000
Total employees	3,864
Labor (number)*	3,077
Other employees (number)	787
Man hours, labor	6,229,000
Principal expenses	$42,037,000
Wages of labor*	$14,619,000
Salaries	$4,846,000
Supplies	$14,055,000
Purchased electric energy	$44,000
Contract work	$2,833,000
Purchased machinery installed	$2,803,000
Capital expenditures	$8,845,000
Horsepower rating of power equipment	161,000

Statistics for Potash, Soda and Borate Minerals Industry

Value of shipments	$107,752,000
Total employees	6,168,000
Labor (Number)*	4,736,000
Other employees	1,432,000
Man hours, labor	9,359,000
Principal expenses	$58,562,000
Wages of labor*	$23,024,000
Salaries	$9,466,000
Supplies	$17,328,000
Purchased electric energy	$1,640,000
Contract work	$1,510,000
Purchased machinery installed	$8,390,000
Capital expenditures	$8,920,000
Horsepower rating of power equipment	187,000



* These figures apply to production and development workers. All figures obtained from preliminary results published by the United States Department of Commerce.

United States

Personalities in the News

NELSON C. WHITE (left), formerly manager of the Potash Division, International Minerals & Chemical Corporation, has been named vice president in charge of the division. Succeeding him as general manager is CARL AREND (right), who was manager of the firm's mining and chemical operations at Carlsbad, New Mexico. Other key promotions at International include JAMES B. CASTLE, who was appointed manager of the Industrial Minerals division, and ROGER BART, who has been named manager of the Research Experiment station at Mulberry, Florida.

Wallace G. Woolf, manager of metallurgy, has been named general manager of Bunker Hill & Sullivan Mining & Concentrating Company, Kellogg, Idaho, succeeding **P. C. Fedderson**, who recently retired. Mr. Woolf came to Bunker Hill in 1918 as research metallurgist and was the original superintendent of the Sullivan zinc plant. Former Bunker Hill president **J. B. Haffner**, who retired earlier this year, has been named president of International Oil & Metals Corporation, a new firm which is starting an extensive exploration program in the western states.

C. D. Michaelson, vice president and chief executive of Kennecott Copper Corporation's Chile subsidiary, Braden Copper Company, will become general manager of Kennecott's western mining division. He succeeds **J. P. Caulfield** who has become assistant to vice president **Frank R. Milliken** in Kennecott's New York City offices. Mr. Michaelson, with headquarters in Salt Lake City, Utah, will supervise properties in Utah, Nevada, Arizona, and New Mexico.

Stuart S. Merwin and **Charles E. Melbye** announce they have formed a partnership for geological and geophysical consulting work with headquarters in Golden, Colorado. Both men were formerly associated with Minerals Exploration Research Corporation, Golden.

Edgar F. Ackerman is the new superintendent of the Little Rock, Arkansas activated bauxite plant and mine of Consolidated Chemicals Industries, Inc. He replaces **E. J. Creider**, who was recently named assistant plant manager at the company's Fort Worth, Texas acid plant.

Dale I. Hayes, western manager for American Zinc, Lead and Smelting Company, Spokane, Washington, has been promoted to assistant to president **Howard I. Young**, with headquarters at Knoxville, Tennessee. **Ralph E. Calhoun** will succeed Mr. Hayes in Spokane. **John W. Currie**, general superintendent of the company's Grandview mine at Metaline Falls, Washington, has been promoted to resident manager.

Richard C. Cole, plant manager of the Salt Lake City, Utah uranium mill of Vitro Corporation of America, was promoted to assistant general manager of Vitro Uranium Company. He will continue as plant manager at the mill and will also take part in Vitro Uranium's expanding uranium processing activities.

M. G. McGrath was selected as general manager of Croff Oil & Mining Company's newly formed mining division. Mr. McGrath is a former employe of Cerro de Pasco Copper Corporation, United States Vanadium Company, Vanadium Corporation of America, Vitro Uranium Company, and the U.S. Atomic Energy Commission. Croff Oil has uranium properties in Utah and Colorado.

Carl Hahn succeeds **John A. Peterson** as president of Chewalah Copper Company, Chewalah, Washington. The company's properties east of Chewalah are being operated by **Earle B. Gibbs** under a profit-sharing agreement.

John B. Marshall was named president and **Otho Murphy** vice president of Mia Nina Mining Corporation, Salt Lake City. The company, which was incorporated in Colorado in June, has 39 claims in Arizona, plus six Piute County, Utah claims and a school lease in San Juan County, Utah.

J. McLaren Forbes is chief geologist of Consolidated Coppermines Corporation, Kimberly, Nevada. Other promotions recently announced by the firm include **W. J. Latvala**, former assistant chief engineer, who was named mine superintendent, and **Charles R. Sacrison**, who has been advanced to general pit foreman at the company's new Tripp Copper Pit.

Jacob Blecheisen, president of Rosiclare Lead and Fluorspar Mining Company, Rosiclare, Illinois, is serving on the special fluorspar advisory committee appointed by Secretary of the Interior **Douglas McKay**. The group consults with the Office of Minerals Mobilization on matters of interest to the fluorspar industry.

C. J. Parkinson, the Anaconda Company was elected vice president and director of the Anaconda Aluminum Company, succeeding **Frederick Laist**, recently retired from the aluminum subsidiary's board and from the president of International Smelting and Refining Company.

Robert Miller, former mining geologist with Day Mines, Inc., at Wallace, Idaho, has been named field representative of the U.S. Atomic Energy Commission in Tucson, Arizona. Mr. Miller has been with the AEC since May, and was formerly stationed in Utah.

C. Kremer Bain, St. Louis, Missouri, consulting engineer, has been touring shaft sinking operations in the western states. Previously, he was manager of Missouri Mines for the St. Joseph Lead Company.

Key promotions at the various divisions of Kennecott Copper Corporation include the following: At the Chino Mines division **Paul Hunter** was named safety engineer, replacing **D. M. Berry**; **B. C. Jacobs** was named general mill foreman, succeeding **Fay Henry**, who retired this month; and **Paul Lemke** was promoted to metallurgical engineer at the mill. At the Utah Copper Division **Ivor G. Pickering** has been appointed to the newly created position of chief designing engineer at the new research center on the University of Utah campus; **Ray F. Gough**, formerly director of safety and fire control, was appointed general mine foreman at the Bingham Canyon mine; and **Thomas R. Carlson** has been named assistant general drilling and blasting foreman. Promotions at the Nevada Mines Division include **William Gibson**, industrial engineer, and **Donald R. Gunther**, director of the new concentrator metallurgical department. The Ray Mines Division has announced appointment of **John M. Hood** and **Ted A. Beck** to the staff of the industrial engineering department.

UPHOLDS ZINC PRICE RISE

"Since October, a year ago, the price of lead has advanced ½-cent a pound and zinc 1½ cents. But much of the small gain of 2 cents, which amounts to 7 percent of the combined price of the metals produced from the mining of complex lead-zinc ores, has been wiped out by another round of wage increases and rising prices for supplies. Industrial raw materials are up some 12½ percent, the price of aluminum has advanced 2.2 cents a pound, and copper 13 cents. Higher wage costs and the expense of social security responsibilities assumed by the mass producing industries are being passed on to the consumer . . . . But the lead-zinc mines are forced to compete in world markets on a virtually free-trade basis and to meet the prices of low-valued foreign production . . . . Would the die casters prefer prices for zinc that will permit the survival of a healthy mining industry in this country . . . or is it preferable to end up with our supplies dependent on labor troubles in Chile and Africa such as is now the case with copper at prices 43 to 50 cents a pound?"—OTTO HERRES, vice president, Combined Metals Reduction Company, in reply to a statement by the American Die Casting Institute that the recent advance in price of zinc was unwarranted.

Charles E. Robertson, International Minerals & Chemical Corporation, has joined the firm's potash division in Carlsbad, New Mexico, as a member of the mine engineering crew.

Charles A. Lindberg, Oliver Iron Mining Division, U.S. Steel Corporation, has been appointed assistant superintendent of maintenance for the Eastern district operations. His headquarters are in Virginia, Minnesota.

E. W. R. Butcher, chief mining engineer for the Northern Ore Mines, Republic Steel Corporation, has retired after 37 years with Republic. He began his career with the firm in 1909 when it was still known as Republic Iron and Steel Company.

David W. Tittman, mining engineer, is now employed by the Erie Mining Company, Aurora, Minnesota.

Douglas C. Penman has been named to the field staff of Moab Mines, Inc., Moab, Utah. He will direct all survey and mapping procedures for the company. He was formerly associated with the Southwest Steel Company and served as engineer and surveyor for the N. B. Hunt exploration group on the Colorado Plateau.

Mostyn G. Grant, Cyprus Mines Corporation, is now located in Tucson, Arizona. Formerly he was in charge of exploration work in Butte, Montana, which was carried on by Coronado Copper & Zinc Company, a subsidiary of Cyprus Mines.

Donald R. Tone, 1951 Missouri School of Mines graduate, has set up a consulting practice in the Colorado Plateau area. His headquarters are at Durango, Colorado.

Walter A. Sterling, president of Cleveland-Cliffs Iron Company, was named chief executive officer of the firm at a recent board meeting in Cleveland, Ohio. He assumes these duties from **Alexander C. Brown,** chairman of the board. Mr. Sterling has been with Cleveland-Cliffs since 1929.

Charles A. Chase

An Appreciation by
J. D. HARLAN

(Charles A. Chase of the state of Colorado died August 31, 1955 at the age of 79. The following is a tribute by a mine operator who had his start with Mr. Chase in Telluride, Colorado almost 50 years ago and who retained his friendship thence throughout the latter's life. He was educated at the University of Colorado, was a member of AIME for 55 years and was frequently honored in mining circles in the State of Colorado.—Ed.)

Under the guidance and with the sympathetic understanding of Arthur Winslow, Mr. Chase managed the Liberty Bell Gold mine through most of a productive period of nearly 25 years. With gold at the then prevailing value of $20.67 per ounce the average net mint and smelter return was a little less than $7.00 per ton of ore milled and the profit from some 2,370,000 tons approached $3,000,000, a masterly accomplishment under the rugged circumstances of the operation.

The comparatively low-grade Liberty Bell mine was contemporary with the well-managed Tom Boy; the rich Camp-Bird at Ouray; the famous Silver Lake of the Stoibers at Silverton; and the glamorous Smuggler-Union at Pandora. Notwithstanding the rugged and often disheartening operating conditions and the more favorable positions of neighbor-operators Charles Chase stuck closely to the task, improved mine method and equipment, kept abreast of betterments in milling practice, never lost sight of the cost factor, and managed his low-grade mine to an outstanding success.

He envisioned the possibility of another Liberty Bell in a group of mines at Silverton and moved to that isolated region to equip and manage the second and last major undertaking of his career, Shenandoah Dives Mining Company. There he lived and struggled against even greater odds than at Liberty Bell—the terrain was equally rugged, the ore of lower average value, and eventually conditions in general inflated costs without compensating increase in value of ore. Even so, Mr. Chase's managing performance at Silverton was even more remarkable than in Telluride because economic conditions were more variable and other odds much greater.

Notwithstanding adversity and disappointment Charles Chase continued courageous and honest, never ceased giving his all toward creation of wealth in his beloved state of Colorado as well as stability in his mining community, and ever remained dignified, tolerant, humble, and modest—a really great man. Surely for him there will be a gold-mine in the Sky.

Continued on page 108

Newsmakers in International Mining

C. H. RICHARDS, (right) mining engineer, is now located in Cornwall, England. He recently completed his assignment as general manager of Uruwira Minerals, Ltd. at Mukwamba, western Tanganyika, by bringing the mine and mill up to a 1,000-ton-per-day capacity. Succeeding Mr. Richards as general manager at Uruwira is WILLIAM PIERCE MORRIS of Southern Minerals Ltd., who has had many years of mining experience in the Colorado Plateau and Coeur d'Alene mining areas of the United States.

J. W. Still has resigned as general superintendent of Miami Copper Company to become associated with his son, **Arthur R. Still,** who operates a consulting geological and engineering firm in Prescott, Arizona. J. W. Still has had wide operating experience in the Philippines and in Arizona where he worked successively for Phelps Dodge Corporation, and Bagdad Copper Corporation. During World War II he was a copper specialist with the Foreign Economic Administration, and Metals Reserve Company.

Allen J. Gittos has left Broken Hill Associated Smelters Pty. Ltd. at Port Pirie, South Australia, and assumed the position of assistant alumina superintendent for the Australian Aluminum Production Commission in Tasmania.

William J. Waylett, formerly chief, technical services branch, Division of Raw Materials, U. S. Atomic Energy Commission, has taken the post of chief of the Minerals Resources Division, U. S. Operation Mission to Israel. His headquarters are in Tel Aviv, Israel. Mr. Waylett for many years was author of the "Uranium Summary" which appears each year in the MINING WORLD Catalog, Survey, and Directory Issue published each April 15.

K. Richardson has resigned as general manager of Johannesburg Consolidated Investment Company, Ltd.,

SOLOMON LIEB, metallurgical ore dressing consultant for the Corporacion Minera de Bolivia and general superintendent of the company's mills and laboratories, terminates his contract with the organization at the end of this year. During his 2½ years with the firm, wolfram production rose from 1,013.822 metric tons in 1952 to approximately 1,649.866 tons in 1955. He has initiated some 15 projects to construct new tin, lead, silver, zinc, and bismuth mills, including the recently completed Tasna and Chorolque tin mills. After leaving Bolivia, Mr. Lieb will reside in Jamaica, New York.

Union of South Africa. **D. A. B. Watson** has succeeded him, and **I. M. Campbell-Rodger** has been appointed manager. **R. S. Cooke,** general manager of the Randfontein mine, has been named consulting engineer for the company.

J. Iedoux, who was previously with the Societe Anonyme des Mines de Fer de Mauritanie, Paris, France, has joined the Societe Miniere et Metallurgique de Penarroya. His headquarters are in Cordoba, Spain.

F. W. Godden is now located in Dalkieth, Western Australia.

G. W. Bain, United States geologist, has been on a tour of Australian uranium operations. His trip included trips to Mount Isa, Mt. Lyell, Radium Hill, Broken Hill, Rum Jungle, and Alligator River.

Jacques Y. P. Sejournet, managing director of the Comptoir Industriel d'Etirage & Profilage de Metaux of France, has received the Franklin Institute's Wetherill Medal. The award was presented to Mr. Sejournet for his part in invention of the Ugine-Sejournet extrusion process for steel and other metals.

P. C. CAIN, formerly Nababeep mine superintendent at O'okiep Copper Company, Ltd.'s operations in the union of South Africa, has joined the staff of Sherritt Gordon Mines, Ltd. He is currently acting as mine superintendent for Sherritt Gordon's nickel operations at Lynn Lake, Manitoba, Canada. Mr. Cain was one of the authors of an article on the Nababeep mine which appeared in the special O'okiep Copper Issue of MINING WORLD, May 1955, page 39.

R. D. Lindberg, assistant superintendent of the United States Steel Corporation's Oliver Iron Mining division of Ironwood, Michigan, has joined the staff of the Philippine Iron Mines, Camarines Norte, Philippine Islands.

Peter R. Nairn, Raub Australian Gold Mining Company, Ltd., has left Malaya for Australia. While in Malaya, his headquarters were at Raub, Pahang.

David A. Beverley is now general manager of Johannesburg Consolidated Investment Company, Ltd., succeeding **Kenneth Richardson.** Mr. Richardson is continuing to serve the company as an executive director.

Russell R. Bryan, Jr., iron ore consultant, is now on a six-week consulting tour of the Dominion Republic and Venezuela. Mr. Bryan is former mining supervisor for the Orinoco Mining Company.

Vincent J. White has joined the staff of Compania Minera Choco Pacifico in Colombia as construction superintendent. He was formerly employed by Northern Greece Goldfields, Ltd., Kilkis, Greece.

EDWARD McL. TITTMANN has been elected president and chief executive officer of Southern Peru Copper Corporation, which is currently undertaking the development of the Toquepala copper deposit in southern Peru. Mr. Tittmann was formerly general manager of the western department of American Smelting and Refining Company. Southern Peru Copper is jointly owned by American Smelting, Cerro de Pasco Corporation, Newmont Mining Corporation, and Phelps Dodge Corporation.

Alain Brute de Remur, French Bureau of Mines, has been making an extended tour of the United States and Canada to study latest developments in mining and milling methods.

Ian Cameron, manager of King Island Scheelite Ltd.'s open-pit mine on King Island, Australia, has been touring mining operations in the United States.

R. H. Ordun is organizing Bezotte Drilling, a diamond drilling concern in the Philippine Islands.

R. K. Ramadhyani has been named secretary of the Union Ministry of Natural Resources and Scientific Research, Bombay, India.

An eleven-member steel delegation from Bharati, India has completed a tour of Soviet factories. The group was headed by **S. S. Khera,** secretary, Bharati Ministry of Production. A portion of the delegation also visited Czechoslovakia and Yugoslavia.

A group of Indian geologists and engineers, headed by **K. D. Malaviya,** Union Minister for Natural Resources, have been touring the USSR, England, Rumania, and West Germany. The delegation has been studying mineral and oil exploration methods in these countries.

George Utermohle is chief geologist and mining engineer of Atlas Uranium Corporation, Moab, Utah. He has mining experience in Venezuela, Alaska, Kansas and Texas, as well as on the Colorado Plateau.

DAVID PORTEOUS, mining engineer from Malagash, Nova Scotia, has been appointed resident property manager for Anglo-Rouyn Mines Ltd. A major underground development program at the company site at Waden Bay on Lac La Ronge in Northern Saskatchewan, Canada has been started under Mr. Porteous' direction. The project involves sinking a three-compartment, vertical production shaft, opening three mining levels, and development of 1,000 feet of lateral development. Technical Mine Consultants are company managers for Anglo-Rouyn Mines.

INCREASING FOOTAGE OF DIAMOND CORE DRILLS

with Stoody Acetylene Tube Borium

When we think of diamond studded tools, hard-facing seems unnecessary... after all, the diamond is nature's hardest, most wear resistant substance. Although core bits and their connecting reamers are set with industrial diamonds for extending overall life, the barrels and flutes don't benefit by these inserts. Here's how one operator increased footage of sampling drills from 400 or 500 feet to between 2000 and 3000 feet.

After making comparative tests of several hard-facing materials, 30-40 Acetylene Tube Borium (containing tungsten carbide particles) was selected because of its excellent wear resistance. Reamer bodies were hard-faced with a series of parallel longitudinal beads, the deposits extending around those areas containing the diamond inserts.

Since walls of the core barrels are thinner at each end because of internal threads, wear weakens these areas quicker than the remaining barrel. By hard-facing back 6" from each end and adding extra protection over the threaded areas overall barrel life is equalized. When the hard metal is gone the entire barrel has delivered maximum service. Flutes, attaching core barrels to drill rods, are hard-faced on outside diameters.

Straight edge of saw blade shows how hard-faced end of barrel has held its size.

Stoody Hard-Facing Alloys afford maximum protection to all wearing equipment. For recommended alloys and application technique on your specific wear problems refer to the

Notice how hard-facing beads surround but do not cover diamond inserts.

Stoody Hard-Facing Guidebook. Your Stoody dealer has a copy for you or write direct.

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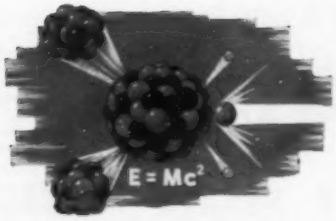


FISSION FACTS

Monthly Roundup of Mining News In the Atomic Energy Field

Lindsay Chemical Options Canadian Monazite Lode

Lindsay Chemical Company, Chicago, Illinois, has obtained a two-year option on a monazite lode deposite in northwestern Saskatchewan, Canada. The option covers 18 claims in the CE group of the Lake Athabaska mining district near Uranium City.

Discovered in 1954 by airborne scintillometer prospecting, the deposit contains a main vein averaging 12 feet wide and assaying to 15 percent monazite. Thorium content of the unconcentrated ore averages a little more than 1.0 percent thorium oxide. The deposit is in a northwest trending fault breccia zone at a formation contact between amphibolite and granite gneiss associated with pegmatites. Also present are biotite and pyrite.

Utah Operators Required To Monitor Radon Content

The Industrial Commission of Utah has announced that beginning January 1, 1956 mine operators in Utah will be required to monitor periodically radon daughter concentrations in their mines. The order came as a result of studies indicating that prolonged exposure to radon is injurious to health, and it is expected that similar laws will eventually be passed in other states in which uranium mining is being carried out.

The Utah regulation is as follows:

1. The operator of every uranium mine, whether operated by shaft, slope, tunneu, adit, or drift, shall provide and maintain for every such mine a good and sufficient amount of ventilation for such men and animals as may be employed therein, and shall cause an adequate quantity of pure air to circulate through and into all shafts, winzes, levels, and all working places of such mine, and, except in case of an emergency, no man shall be allowed to work in an atmosphere injurious to health.
2. The atmospheric concentration of the immediate daughters of radon should not exceed 300 MMCL as determined by a field method acceptable to the State Bureau of Mines (Industrial Commission) and every operator shall make a reasonable effort to approximate said standard.
3. a) Rule on determination of concentration of the immediate daughters of radon—It shall be the duty of every operator to cause an inspection of the mine to be made each month for the purpose of determining the concentration of the immediate daughters of radon, provided, however, that at the discretion of the Mine Superintendent or the State Mine Inspector more frequent determinations may be made, and all such determinations shall be made at the working place.

3. b) Recording of determinations—It shall be the duty of the operator to maintain a record book at the mine office wherein the individual making the inspection and determination shall record his findings in his own handwriting and over his own signature, setting forth specifically the time and the places of inspection and determination, and such information (record book) shall be available to the mine inspector on request.

It is understood that operators will be required to provide their own equipment for the monitoring. Cost of equipment, as suggested for Utah operators by the United States Public Health Service, is estimated as follows: Juno Alpha-Beta-Beta-Gamma survey meter, Model SRJ-1, $230.00; Denver pump, $120.00; molecular filters, 1-inch-AA, $12.50 per hundred; Molecular filter holder, no price stated.

Roundup of Uranium Highlights

UTAH—The famed Happy Jack uranium mine in White Canyon, San Juan County, is reportedly for sale by owners Joe Cooper, and Fletcher and Grant Bronson of Monticello. No large-scale mining has ever been done at the operation, which has reserves estimated at anywhere from 500,000 to more than 1,000,000 tons.

FRANCE—Uranium production is expected to increase by 400 percent within three years, and a nuclear power plant will be in operation before 1957. Discovery of uranothorianite ore fields have been announced in Madagascar, making France one of the world's main producers of thorium.

NEW YORK—Rumors are now prevalent that Floyd B. Odlum of Atlas Corporation plans to consolidate all of his uranium interests under the Atlas heading. Subsidiaries involved in current talks are Airfleet, Inc., San Diego Corporation, Albuquerque Associated Oil Company, and Wasatch Corporation, all of which have interests in uranium companies and leases. Hidden Splendor Mining Company and the independent Mountain Mesa Uranium Corporation have also been mentioned in these talks, which were precipitated by the proposed Atlas-RKO Pictures merger.

UNION OF SOUTH AFRICA—Virginia Orange Free State Gold Mining Company, Ltd. will treat concentrates from the Merriespruit Orange Free State Mining Company's uranium mine in the near future. Payment to Virginia for uranium ore in its first month of production was £35,000.

COLORADO—New-Shat-Tex Company is the name of the joint uranium venture of New Jersey Zinc Company, Shattuck Denn Mining Corporation, and The Texas Company, which has opened offices in Grand Junction. The firm holds several hundred square miles of mining leases on Navaho Indian Reservation lands in Arizona, Utah, and New Mexico.

CANADA—Uranium output value for 1955 will reach an estimated $48,000,000. This compares with a yearly production of $6,000,000 at the end of World War II. By 1958 it is believed that uranium will rank third in value among Canadian mineral production.

AUSTRALIA—Interest in uranium in Queensland appears to have died down except for operations of Australasian Oil Exploration Ltd. and Rio Tinto, Ltd. Most companies actively exploring or producing ore are located in the Northern Territory.

NEW MEXICO—Four Corners Uranium Corporation, Denver, Colorado, has leased 2,500,000 acres in eastern Arizona and western New Mexico for mineral exploration. In addition to extensive exploration work, mining is starting on Tovrea Land & Cattle Company's White Signal mining district claims near Silver City, New Mexico.

WYOMING—A 50,000-ton ore body has been blocked out by Lost Creek Oil & Uranium Company at its Sno-Ball claims in central Wyoming. Daily production is 80 tons, and the firm has requested AEC permission to construct a uranium processing mill.

NEW YORK—Cullen Minerals Corporation, backed by a group of Texas industrialists, investment bankers, and oil operators, has been formed to develop and operate mineral, oil, and gas properties. The firm is operating Terminal Oil Company's uranium mine in Mesa County, Colorado.

UNION OF SOUTH AFRICA—Western Holdings Ltd. and Welkom Gold Mining Company, Ltd. have announced that they plan to enter uranium production.

NEW MEXICO—The U.S. Atomic Energy Commission will purchase a limited tonnage of uranium ores now being produced in the Grants, New Mexico area. The short-term arrangement will provide a market for certain ores not amenable to processing at the Bluewater plant of The Anaconda Company.

AUSTRALIA—Proved ore at the El Sharana lease in the Northern Territory totals 52,500 tons assaying 0.46 U_3O_8. On the Palette lode three miles away pitchblende ore has been found, but no evaluation of this discovery has yet been made.

PCA Starts To Sink Deep Canadian Shaft

Potash Company of America, Ltd., Canadian subsidiary of Potash Company of America, has started actual shaft sinking operations at its property near Saskatoon, Saskatchewan. The shaft will be sunk to a 3,000-foot depth, under the direction of Tom Hudson, a master sinker from the Union of South Africa, who has been engaged to supervise this work.

By mid-1956, the company hopes to have started surface construction work, such as the refinery, trackage, warehouses, etc.

Norwegian Ilmenite Firm Announces Ore Discovery

Re-examination of its extensive ilmenite holdings near Jossingfjord, Norway by A/S Titania has revealed deposits estimated to contain more than 100,000,000 tons of ore. The new discovery is near the Sogndal mines and shipping port of the parent company, Titan Company A/S. Most of the ilmenite is accessible for open-pit mining.

The new find means that A/S Titania, Norway's chief producer of titanium dioxide, will be able to raise its annual ilmenite concentrate production from 160,000 tons to more than 200,000 tons. Norway supplies about 16 percent of the total world supply and currently is competing with India for a bigger share of the market. Indian concentrates contain approximately 60 percent titanium dioxide, and A/S Titania has erected an experimental plant in Jossingfjord to seek a method of raising the TiO_2 content of the Norwegian concentrates, which now assay about 45 to 50 percent.

Mountain Mesa Uranium Buys Cal Uranium Mine

Sale of the Cal Uranium mine in the Big Indian District of San Juan County, Utah by the Ruddock interests to Mountain Mesa Uranium Company, Casper, Wyoming, has been announced. Purchase price was $2,800,000, which was advanced to Mountain Mesa by Hidden Splendor Mining Company, subsidiary of Atlas Corporation. Mountain Mesa reportedly will repay Hidden Splendor within one year at six percent interest.

Cal Uranium's holdings include the San Juan shaft. Under the new transaction the mine will be operated as a Mountain Mesa subsidiary.

Earlier this year the Ruddock family sold 785 claims in the Big Indian and Moab, Utah areas which were held by Cal Uranium and Almar Minerals Company to a Wyoming syndicate for more than $10,000,000. The Ruddocks own a 51 percent interest in Almar Minerals.

Deep Drilling Increases Atlas Copper Reserves

Atlas Consolidated Mining and Development Corporation has completed surface diamond drill hole No. 26 at its Toledo copper mine, Cebu, Philippine Islands. This vertical hole was drilled to a depth of 1,300 feet. It was collared in the hanging wall of the ore body (see Atlas cross-section map on fold-out section facing page 56 of September 1955 issue of MINING WORLD) and entered the ore body at a depth of about 700 feet. The hole bottomed in 1.0 percent copper, 400 feet below previously calculated ore blocks. Atlas's consulting engineers have recalculated ore reserves following completion of this hole, according to reports from the Philippine Islands. Total indicated reserves are now 47,000,000 tons.

Col. Andres Soriano, president of Atlas, reports that production for September totalled 3,633 dry short tons of copper concentrates estimated to contain 1,665,740 pounds of copper and 545 ounces of gold. The concentrates during September averaged 23 percent copper and 15 ounces of gold per dry short ton. Ore treated during the month amounted to 107,532 tons, with an average copper content of 1.5 percent and an average gold content of 0.01 ounce per ton. The figures represents 26 days of mining operation.

Kaiser Steel Buys Limestone Deposit

Kaiser Steel Company has exercised its option for the immediate purchase of a large high-grade limestone deposit at Cushenbury California, only 75 miles from the company's Fontana plant. The purchase price was in excess of $1,000,000. Development of the open-pit mine is underway although it will be about a year before all facilities are installed to permit full-scale mining and shipping.

The property is near Lucerne Valley, 30 miles southeast of Victorville. The Atchison, Topeka & Santa Fe Railway has agreed to build a 32-mile railroad connecting the quarry with the main rail line at a point near Hesperia, California.

The acquisition of this deposit will make Kaiser Steel completely self-sufficient from the standpoint of raw materials needed for the operation of its three blast furnaces, say company officials. Until now, limestone had been purchased from outside suppliers, principally in Nevada.

INCO Drives Truck Tunnels in Open-Pit Walls

In an engineering project unusual in open-pit mining, The International Nickel Company of Canada, Limited, is driving two vehicular tunnels with a total length of 2,200 feet in the walls of its Frood-Stobie open pit in the Sudbury district of Ontario, to permit greater recovery of ore by low-cost open pit methods. The tunnels will take the place of sections of the main ramp road which winds for almost two miles around the sides of the open pit, now nearly 600 feet deep. When the tunnels are completed, pit traffic will be routed through them, and the affected portions of the ramp road will disappear as the ore over which they lie is mined. The usual procedure of churn-drilling, blasting, and trucking will be used to recover the ore beneath the ramp. The ore comprises a large block in the foot wall, and a smaller block on the hanging wall. A total of 5,000,000 tons of ore is involved. Originally it was planned to recover the ore by underground methods after all surface mining had been completed and the road was no longer required. The ore would then have been mined by the same methods as are being used in the south end of the Frood section of the pit, and also in the Stobie section, where surface operations have been replaced by blasthole mining carried on from the 600-foot level underground. The tunnels will be 14 feet wide and 15-½ feet high. They will be driven some distance inside the foot wall and hanging wall but parallel to the ramp. The longer tunnel, in the foot wall rock, will be 1,800 feet long. The other tunnel, 400 feet in length, will be driven in the hanging wall rock. Construction of the longer tunnel has begun and is proceeding at the rate of 100 feet per week. When both are opened to traffic, trucks will move up through the 1,800-foot leg, then come out at the south end of the open pit before entering the hanging wall tunnel. A smooth, safe flow of trucks hauling ore from the pit will be controlled by stop-and-go lights at the tunnel portals.

UNION OF SOUTH AFRICA—Trial milling is now in progress in the reduction plant of *Free State Geduld Mines Ltd.*, and full production should be attained shortly. The mine is a designated uranium producer, and it is possible that in the near future the residue slimes from the gold reduction plant will be treated for uranium extraction in the Welkom uranium plant. The reduction plant has been completed to a design capacity of 100,000 tons a month, and the initial grade milled may be between 7.5 and 8.5 dwt. a ton, if only development rock is then treated. From the start of reef development to the 30th of September, 10,810 feet were sampled and averaged 703 inch-dwts., equivalent to about 17.6 dwt. over an assumed width of 40 inches.

TANGANYIKA—The first quarterly report for the period ending September 30, 1955 shows that during the initial period of full operations the *Uruwira Minerals* mill treated 66,404 tons of ore containing an average of 2.79 percent lead, 0.49 percent copper, 70.8 grams silver, and 1.5 grams gold per ton. Production of concentrate during this period amounted to 3,278 tons assaying 50.34 percent lead, 8.58 percent copper, 1,230 grams silver, and 25 grams gold per ton. These figures are in line with original estimates for quantity as well as mineral content. It is expected that production will increase to about 1,500 tons of concentrate per month.

FEDERATION OF RHODESIA & NYASALAND—*Chibuluma Mines, Ltd.* started mining of copper-cobalt ore on October 19th, with initial production taking place on the 260-foot and 570-foot levels. The mine is expected to produce approximately 16,000 tons of copper and 500,000 pounds of cobalt annually when in full production. Ore will be stockpiled during the next few months until the concentrator is completed. Copper concentrates will be smelted at one of the sister mines on the copperbelt (either *Mufulira Copper Mines Ltd.* or *Roan Antelope Copper Mines, Ltd.*) and cobalt concentrate will be handled at a plant being built by Chibuluma near Ndola (Northern Rhodesia). Estimated ore reserves at the Chibuluma mine are 7,300,000 tons averaging 5.23 percent copper and 0.25 percent cobalt.

MOROCCO—*Pennarroya*, the French lead and zinc firm, plans to absorb the *Societe Miniere du Haut-Guir* which operates a lead mine in Morocco. Pennarroya already owns the majority of shares in this concern.

FRENCH EQUATORIAL AFRICA—Gold production during the first half of 1955 totaled 761 kilograms, and for the first seven months 831 kilograms. It was not specified whether this was fine or rough gold. Diamond production during the first seven months totaled 99,495 carats; while lead ore output was 2,000 metric tons for the seven-month period.

UNION OF SOUTH AFRICA—The two shafts of *Merriespruit O.F.S. Gold Mining Company Ltd.* have been connected. Trial milling is expected to start soon with gold production to be started early next year. The pumping of uranium and pyrite concentrates to the Virginia acid and uranium plants should follow not long after that.

SIERRA LEONE—*Sierra Leone Selection Trust's* exclusive rights to mine for diamonds in the country have been substantially reduced by the government to approximately 450 square miles. This area will include all of the existing workings and, in addition, the company will be given "reasonable opportunity for a period of not less than 10 years to prospect for deep deposits of diamonds and to mine them if found anywhere in Sierra Leone." As compensation for giving up the areas previously held, the government will pay the company £1,570,000. The agreement signed by both groups also provides that the government will not grant before 1975 any diamond prospecting licenses or leases to any applicants other than Sierra Leoneans, or companies which are substantially controlled by them, without first offering them to the company on equal terms.

KENYA—*Anglo American Prospecting Company (Africa) Ltd.*, a wholly owned subsidiary of *Anglo American Corporation of S.A. Ltd.*, has secured exploration rights over 954 acres at Mrima Hill to the south of Mombassa in Kenya. The deposits include niobium and monazite.

INTERNATIONAL

GREECE—The Ministry of Commerce has approved the export of 20,000 tons of bauxite to the Soviet Union. Shipments will be made from Itea Harbor by the *Paranssus Bauxite Company*, and payment will be arranged through Greek-Soviet clearing agents.

SPAIN—Iron mines at San Miguel de la Duenas in the province of Leon have begun ore shipments, with initial output going to Germany. The flat lying ore is reportedly 26 feet thick, suitable in many places for open-pit mining. Anticipated production in September was 10,000 tons.

ITALY—Treatment of ore at *Montecatini's* new sulphur refining plant in Perticara reached 65 metric tons daily during the 14-month test period carried out at the plant. During trial runs in July, which used a locally mined ore with calcareous gangue and an average sulphur content of 17.06 percent, 80 to 85 percent was recovered in the form of 99.9 percent refined sulphur. The plant was installed by the *Impianti Speciali per l'Industria s.r.l.* (*I.S.P.I.*) and was based on the Masobello refining process. Modifications carried out in the plant will be incorporated in a second plant of this type which was completed in November in Saponaro, Sicily.

WEST GERMANY—Iron ore production has returned to its 1952 level with current rate of output indicating an annual level of 15,369,000 metric tons. Production in 1954 was 13,039,000 tons; in 1953 it was 14,621,000 tons; and was 15,408,000 tons in 1952.

SWEDEN—*Norrland Mining Company* has been founded in Sundsvall to mine iron ore deposits in the northern provinces of Vaesterbotten, Norrbotten, Jaemtland, and Kopparberg.

SPAIN—The first major shipment of apparatus for the *Central de Lada* steam-electric power station at Langreo has arrived from the *Babcock and Wilcox* plant in Wilmington, North Carolina. Prime contractor for the Lada project is *Westinghouse Electric International Company*, which will ship a 50,000-kilowatt electric generator to Spain in January, 1956. The unit will double capacity of existing Lada facilities and provide power for the city of Oviedo, as well as serving nearby Austrian mining enterprises.

USSR—The Ural Mountains comprise one of the richest mineralized areas in the world, according to a recent report from George W. Malone, United States Senator from Nevada, who recently completed a tour of the Soviet Union. Senator Malone inspected mining operations and heavy machinery plants in the region, and after his return to Moscow visited the Leningrad shale oil plant.

FRANCE—Iron ore output during the third quarter of 1955 reached 11,991,000 metric tons as compared to 10,704,000 tons in the same quarter of 1954. Total production for the first nine months of 1955 was 36,962,000 tons. Output for the corresponding period last year was 32,061,000 tons. Stocks on hand September 30 of this year totaled 3,051,000 tons.

INTERNATIONAL

BURMA—Diamond drilling at the *Nankesay* copper mine has revealed two copper-bearing veins. The mine is near the Sinbo village 85 miles from Myitkyina in the Shan states.

MALAYA—The Southern Kampar No. 1 dredge of *Southern Kinta Consolidated Ltd.* is in the process of being re-erected in the Sungei Bernam area and it is expected that the dredge will be in production during the next 18 months to two years. In view of the improved security conditions, it has been decided to rehabilitate the Rasa dredge but this will probably not be completed before the middle of 1956. Cost of rehabilitation is £315,000, in addition to which the river diversion will require an estimated £117,000.

JAPAN—In keeping with the improved world price for copper, Japanese mines and smelters have increased production this year, except for the period of April, May, and June when strikes reduced operations. Production figures for the first nine months of the year are as follows: January 8,647 metric tons, February 9,162 metric tons, March 10,335, April 6,404, May 7,391, June 5,133, July 9,807, August 10,544, September 10,575.

CHINA—A recent delivery of tungsten ore from China to Austria via Czechoslovakia in a barter transaction has led to speculation about further tungsten shipments from China to the West.

MALAYA — *Kampong Lanjut Tin Dredging* expects its No. 2 dredge to begin trial runs early in 1956 on its new property at Jinjang. The dredge was moved from Malim Nawar. The company's dredge at Wardieburn has remained closed while an extensive series of tests were made to determine the type of equipment necessary to treat the heavy clays encountered. It is expected that these clays will be found in the remainder of the property to be dredged. A full design of the clay treatment plant has been completed and orders currently are being placed for the relevant mechanical items. The tin recovery equipment previously used on the Wardieburn dredge has been transferred and installed at Jinjang.

JAPAN—Japanese steel manufacturers plan to send a survey mission to Malaya to inspect several of the iron ore mines as ore sources for Japanese steel mills. Included will be the *Dungan* mine which has been shipping about 1,500,000 tons annually to Japan. *Yawata Iron & Steel Company, Fuji Iron & Steel Company,* and *Nippon Kokan* have decided to invest $3,027,000 in the *Temangan* iron ore mine owned by the *Oriental Mining Company* of Malaya. The mining firm, in turn, will ship 350,000 tons of ore to Japan in each of the first two years, with tonnage rising to 500,000 tons in the third year.

INDIA—The site for the third steel plant to be erected in India has been selected and approved by the government. The location will be at Durgapur in West Bengal, about 100 miles northwest of Calcutta. British industrialists will build the £82,000,000 plant.

INTERNATIONAL

MALAYA—*Tronoh Mines* estimates that the "lives" of the areas remaining for its dredges are 17 years for No. 1 dredge and 8½ years each for Nos. 4, 5, and 8. The new modern plant installed for the treatment of concentrates is working well, according to the company's annual report; one valuable feature is that it is now possible to separate monazite and other rare earths for which there is an ever-expanding market.

TURKEY—*Eti Bank's Divrik* iron mines have been merged with *Sumer Bank's* Karabuk steel works to form the *Turkish Iron and Steel Works Company*. The Divrik mines are located on the main known iron ore deposit of the country and yearly ore production of 350,000 tons is railed to Karabuk 600 miles away. New furnaces under construction should double the 150,000-ton steel capacity of the plant, and adequate increase in mine production will probably follow.

BURMA—Mineral production from the Tavoy district for the first three months of 1955 is reported as follows: wolframite 147.6 long tons; tin 37.5 long tons; mixed ore 269.9 long tons. Total 455.0 long tons.

MALAYA—Tin exports from Malaya totaled 6,613 tons during September 1955 bringing the total for the first nine months of the year to 54,911. This compares with 53,721 tons during the same period of last year.

INDIA—The *Geological Survey of India* has discovered a large limestone deposit in Andhra containing reserves estimated at 269,000,000 tons. Analysis of samples has shown the deposit to be suitable for the manufacture of Portland cement.

QUEENSLAND—*Mount Morgan Ltd.* mined and handled 3,645,000 tons during its last financial year. Of this, 2,675,000 tons were overburden. The two sulphide mills treated 931,000 tons of ore running from 0.82 to 3.00 dwts. gold and 0.26 to 1.26 percent copper (average 2.14 dwts. and 0.87 percent). A drilling program determined by the company's consulting geologist did not disclose further ore during the year, but the program is being continued. Present reserves are sufficient for approximately 20 years at current production rates.

REPUBLIC OF THE PHILIPPINES—*Mindanao Mother Lode Mines, Inc.* reports that development and construction work at the new copper property in Cabangan, Zambales, is proceeding satisfactorily and that the flotation mill should be in operation by March of 1956. The company has been moving machinery and equipment from its gold property at Surigao during the last few months. Production is hoped for early next year. Mill capacity will be 400 tons per day, but initial operations at the mine are expected to be about 350 tons per day, or about 10,000 tons per month.

INDONESIA—Total tin production of *Bangka, Billiton,* and *Singkep* mines from January to June 1955 was 15,245 tons

as compared with 15,962 tons in the same period of 1954. In June output was 3,446.5 tons and in July 3,394.5 tons.

TASMANIA—In the *Rossarden* mine of *Aberfoyl Tin. N.L.*, recent developments have been favorable. On No. 9 level where veins, though of full width, were lacking in tin and wolframite, driving 300 feet has given payable values again. A winze from the north end of 9 level, down 120 feet to 11 horizon, shows ore throughout. The company expresses satisfaction at present firm tungsten prices which are £A13 per unit in the open market. This is below the company's existing pricing basis with the British Ministry of Supply but is regarded as adequate.

REPUBLIC OF THE PHILIPPINES—*Palawan Quicksilver Mines* reports that its new mercury reduction plant treated 1,522 tons of cinnabar ore in September for a production of 7,085 pounds. During the trial-run period in August, the plant had produced 940 pounds. Mechanical and temperature problems are still being encountered, but are gradually being eliminated and the mill should be operating a full capacity soon. The mine is located in Tagburos, Puerto Princesa, Palawan.

INDONESIA—All claims granted before 1942 and not re-registered by October 11, 1955, were declared to be expired by the Minister of Economic Affairs. Claim holders had had three months notice for filing. Concessionaires are now required to develop their claims within one year after re-registration. The government plans to give the concession of the *Ni-mine Kolaka*, formerly held by *Oost-Borneo Maatschappij* and now expired, to national employers and to engage Japanese mining engineers to work the concession.

NEW GUINEA—*Bulolo Ltd.*, in three months ended August 31, treated 3,249,500 cubic yards for a recovery of only 6,754 ounces of gold, compared with 3,478,750 yards for 11,540 ounces in the same period of last year. The low yield was expected and recoveries will be higher for the rest of the year.

NORTHERN TERRITORY—Plans are being made to construct an all-weather road across the area between Pine Creek and *Northern Hercules* gold mine and from the South Alligator River to Sleisbeck airfield. An allocation of funds has been made and it is hoped that the road will be completed before the coming wet season. During the last wet season, it was impossible to undertake a great deal of uranium prospecting work but conditions will naturally improve as promising areas are developed.

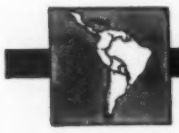
REPUBLIC OF THE PHILIPPINES—September production figures are reported here by some of the mining companies: Treating 13,337 tons of ore, *Itogon Mining Company* at Sangilo recovered 3,196.114 ounces of gold. Operating in the Pinagbirayan Creek area, the dredge "Mary Angus" of *Coco Grove Inc.* at Paracale, Camarine Norte, handled 155,881 cubic yards for a recovery of 691.348 ounces of gold. *San Mauricio Mining Company*, Jose Panganiban, Camarines Norte, milled 10,057 tons of ore for a recovery of 1,480.939 ounces of gold, 5,143.792 ounces of silver, 22,647 pounds of copper, and 96,409 pounds of lead. *Surigao Consolidated Mining Company* produced 4,495.549 ounces of gold, 6,502.28 ounces of silver, and 401,397 pounds of lead concentrates. Tonnage

milled was 11,712 tons of ore, compared with the previous month's output of 11,228 tons. *Lepanto Consolidated Mining* produced 4,559 tons of concentrates estimated to contain 1,977,720 pounds of copper, and 3,537.5 ounces of gold. *Acoje Mining Company* produced 5,353 tons of chrome concentrate.

NORTHERN TERRITORY—*Australian Development N.L.* at Tennant Creek reports values up to 60 dwts. in developing the 215-foot level of the *Noble's Nob* mine. *Northern Hercules N.L.* also reports further high values in developing its mine at Pine Creek. Intersections assaying as high as 13 ounces have been recorded.

INDONESIA – The Dutch - managed firm, *N. V. Sitem*, is not only dredging tin on the island of Bangka, but since 1952 has also been recovering gold that is dredged along with the tin.

NEW ZEALAND—*Imperial Chemical Industries Ltd.* is interested in the possibilities of the ilmenite-bearing sands on the western beaches of the South Island. W. R. B. Martin, an I. C. I. post-graduate research fellow, is working with the Victoria University College on the problem of reducing iron and titanium from the sands.



LATIN AMERICA

CUBA—Formation of a new uranium and oil exploration company, *Cullen Minerals Corporation*, has been announced by the firm's president, Lucien Hugh Cullen of Houston, Texas. Mr. Cullen says that among the firm's properties are the mineral rights on 90,000 acres of land in Cuba.

CHILE—Copper production from the three United States-owned mines in Chile for the month of September 1955 was as follows: *Anaconda Company's Chuquicamata* mine produced 95,000 metric tons of electro copper and 62,000 metric tons of blister; Anaconda's *Potrerillos* mine produced 32,400 metric tons of blister; *Braden Copper Company's El Teniente* mine produced 83,360 metric tons of fire refined copper and 22,306 metric tons of blister. Total output of the three mines for the first nine months of 1955 was 295,066 metric tons, compared with 216,503 metric tons in the same period of 1954.

CUBA—The *Howe Sound Company* of New York has members of its exploration department in eastern Cuba to study a copper property which merits further investigation. A lease and option has been arranged.

CHILE—German capital is reported to be interested in opening a copper ore body near Rio Blanco, 50 miles northeast of Santiago. No specific plans have been announced, however. With the necessary equipment, the Chilean government estimates that one of the mines in the group could be worked at the rate of 7,500 tons of 2.3 percent ore daily, and could produce 54,000 tons of copper yearly. At another mine, some 2,700,000 tons of 0.8 percent copper ore have been blocked out which also contain 9 grams of silver per ton. One other mineralized

body in the group has not yet been prospected.

JAMAICA—*Aluminium Ltd.* has completed plans for additional expansion of its Jamaica works which will more than double the alumina production capacity. Present capacity is 230,000 tons annually. Work started earlier this year will increase this to about 300,000 tons, and the newly announced plan will boost the plant's potential to a total of 543,000 tons yearly. The $17,000,000 program is scheduled for completion by mid-1957, and will include additional shipping facilities at Port Esquivel, rolling stock for use on the Jamaica Government Railway, mining equipment, and new wells, in addition to actual plant expansion.

CHILE—Two firms have been granted permission over this past year to develop copper mines in Chile, but no further reports have been made of their activities. The firms are *United Santamin Mining Company Ltd.* of Toronto, Canada, who was to import $3,000,000 worth of machinery and equipment into Chile to develop a copper group known as the *Sagasca* in north Chile; and the *South American Enterprises Consolidated* which was to invest $500,000 to start development of the *Mantos Blancos* ore bodies in the province of Antofagasta.

CUBA—*Canadian Astoria Minerals* has taken over an abandoned copper property in Cuba and started unwatering of the shaft workings. Known as the *San Manuel* group, the mine was worked prior to World War I when seven short adits were driven and a shaft sunk to 275 feet. An estimated 56,000 tons of ore were developed on four levels, grading at least 4.8 percent copper with values also in gold and silver. If sampling proves these estimates to be correct the new operators will install a concentrator. A new road is now under construction from the shaft site to the main highway.

BRAZIL—*Companhia Siderurgica Nacional*, the largest steel plant in the country, has been authorized to cooperate with the *Companhia Siderurgica Paulista* (*COSIPA*) to build a new steel plant in Piassaguera, district of Cubatao, State of Sao Paulo. That company will provide what is necessary for the project, and 120,000,000 cruzeiros which will be repaid by 1959. The new plant will be similar to the *Volta Redondo* plant (Cia. Siderurgica Nacional) with eventual production planned for 1,000,000 tons annually.

BOLIVIA—The recently completed iron smelter at Cochabamba has not been able to start operations because the contractor has failed to provide fuel. The smelter will use five metric tons of charcoal daily, which the owner is now undertaking to procure from his own property.

BRAZIL—A rich deposit of uranium minerals has been reported in the gold mining district of Jacobina, state of Bahia.

CUBA—The Ministry of Agriculture reports that a total of 28 land claims for radioactive materials have so far been filed in Cuba. The breakdown according to provinces: nine in Pinar del Rio, seven in Matanzas, six in Havana, five in Las Villas, and one in Camaguey.

VENEZUELA—*Elektrokemisk A/S* of Oslo, Norway has been awarded a contract to deliver and install electric smelting furnaces for the 380,000-ton-annual capacity pig iron plant to be built in Matanza, Venezuela.

JAMAICA—*Kaiser Bauxite* recently opened a new mining area at Comfort. A belt conveyor system has been put into operation which may be the first high-tension belt system ever installed in the Caribbean area. Bauxite ore mined from the area is carried up the hill via the conveyor; then it is loaded on rail cars for shipment to Port Kaiser.

BRITISH COLUMBIA—The *American Smelting and Refining Company* has a tentative agreement with *Bethlehem Copper Corporation* to manage the latter company's property southeast of Ashcroft. ASARCO will diamond drill 8,750 feet to determine ore tonnage possibilities at depth. Extensive bulldozing has already been done on the 100 claims. The agreement provides for a five-year program of work, with an estimated expenditure of $115,000 during the first year, but ASARCO may withdraw at any time after that first year.

NOVA SCOTIA—*King Copper Mining Corporation* reportedly has signed an agreement with *Kennco Explorations (Canada) Ltd.*, a subsidiary of *Kennecott*

Copper Corporation, for exploration and development of 200 square miles of potential copper-bearing country in Nova Scotia.

ONTARIO—*Steep Rock Iron Mines Ltd.* set a new daily production record on October 18 when 21,663 tons of ore was loaded. Ore production for the season as of that date was 2,002,002 tons.

ALASKA—Crews are constructing a 25-mile stretch of road from the Koyukuk River to the location of *United States Smelting, Refining and Mining Company's* dredge near Bear Creek. This dredge was moved during the summer months to the Hogatza (Hog) River operation, to be used at the beginning of next season. At Sheep Creek, the firm shut down dragline and conveyor operations on October 10, but continued dredging well into November. Two deep digging dredges continued to take gold from gravel in the Ester vicinity until the season closed.

QUEBEC—*Aluminium Ltd.'s* subsidiary, *Aluminum Company of Canada*, will expand its 92,000-ton smelter at Isle Maligne to provide an additional 22,000 tons a year. The new potroom facilities are expected to cost about $15,000,000. First production is expected in the summer of 1957.

SASKATCHEWAN — *Anglo-Rouyn Mines Ltd.* has let a contract for sinking of a three-compartment, 500-foot shaft on its Waden Bay copper property. The shaft is to be located near the center of the western ore body estimated to contain 1,338,500 tons averaging 2.09 percent copper. The ore body is to be explored from three levels by 1,000 feet of lateral work and considerable underground diamond drilling. The project is expected to take about 14 months.

BRITISH COLUMBIA—*Slocan Van Roi Mines Ltd.* plans to reopen its 150-ton mill at Silverton because of favorable increases in the base metal prices. The company is exploring the Hewitt ore body at an additional depth of 300 feet. Ore will be stockpiled with a view to resuming milling early in 1956 when hydroelectric power is expected to be available.

MANITOBA—*Anglo-Barrington Mines*, a subsidiary of *Western Selection & Development Company Ltd.*, will undertake a $500,000 exploration program on properties in Manitoba and Saskatchewan. A drilling program indicated copper, nickel, and uranium possibilities on the properties.

ALASKA—*Kodiak Exploration Company, Inc.* has 48 claims near Kodiak, Alaska containing showings of tungsten, uranium, gold, silver, copper, nickel, and cobalt. Plans call for development in 1956 when the mining season opens. George H. Cornelius is president, Orsen B. Stillman vice-president and secretary, and Clinton F. Stewart, treasurer.

ONTARIO—*Spanish American Mines Ltd.* is sinking a five-compartment, vertical shaft at its uranium-bearing property near Quirke Lake in the Algoma district.

NORTHWEST TERRITORIES—*Giant Yellowknife Gold Mines Ltd.* reports that production for the year ended June 30,

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1955 amounted to 172,976 ounces of gold and 29,945 ounces of silver from the milling of 286,742 tons of ore. The average milling rate was 788.5 tons per day and calculated mill heads 0.761 ounce gold per ton. In addition, the mill treated 1,054 tons of ore with an average grade of 0.55 ounce per ton obtained from development work on *Lolor* ground. Of the ore treated, 18 percent came from "A" shaft, 74 percent from "B," and 8 percent from "C" shaft workings. Lateral development from C shaft on the 950 and 1,250 levels is proceeding at a satisfactory rate and diamond drilling from these two levels has partly outlined substantial ore bodies of excellent grade in the central ASD zone.

QUEBEC—*Opemiska Copper Mines Ltd.* plans to double present mill capacity from 400 to 800 tons per day. The company's copper mine is in the Chibougamau district, remotely located, and there has been difficulty in getting power to the mine until recently when a transmission line was completed. A railroad spur is under construction and should be completed late next year.

BRITISH COLUMBIA—*Reeves MacDonald Mines Ltd.* has assembled a crew to reopen its zinc mine at Remac and has been shipping a 1,500-ton, two-year-old stockpile of zinc concentrate to the Black Eagle smelter of *Anaconda Company* in Montana. In the Boundary area, *Granby Consolidated Mining, Smelting, and Power Company* has optioned the old *Phoenix* copper property from W. A. McArthur of Greenwood and has started a diamond drilling program. *Surety Oil and Minerals* of Toronto is diamond drilling for copper at the *Mother Lode* property, a major producer in the early mining history of the Boundary area.

ALASKA—*Southeast Mining & Exploration Company*, holder of a uranium property near William Henry Bay on Lynn Canal in southeastern Alaska, is testing the radioactive material at depth. Core results have been encouraging.

ONTARIO—*Technical Mines Consultants* have undertaken the direction of all field operations on the copper-bearing property of *Aberdoon Mines Ltd.* near the town of Desbarats in the Algoma district. Diamond drilling will determine extent of the mineralization.

BRITISH COLUMBIA—*Copper Ridge Silver Zinc Mines Ltd.* is driving an exploration adit at its 60-claim property near Lake Cowichan. The adit is being driven into the hillside beneath the lowest surface trench across a copper-bearing zone. Underground drilling also is planned. Surface work has indicated several parallel copper-bearing shear zones. At Beaverdell, *Highland-Bell Mining Company* has started lateral development work from a mile-long lower adit at its copper mine. Drilling has indicated the ore is more consistent at the 700 feet of additional depth. In the Highland Valley area, *Jackson Basin Mining Company Ltd.* has been making a magnetometer survey of its copper prospect following the finding of copper mineralization in rehabilitated depth.

ALASKA—*Admiralty-Alaska Gold Mining Company* reports discovery of additional high-grade ore at its nickel-copper lode at Funter Bay where a diamond drilling program has been in progress. The company has made application for patents on 20 claims covering this property, and is surveying another group.

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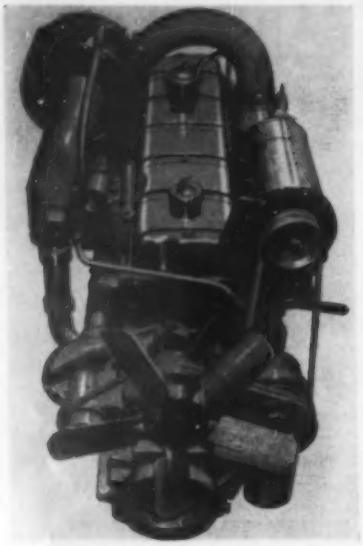
WORLDWIDE PROFESSIONAL DIRECTORY

PRODUCTION EQUIPMENT PREVIEW

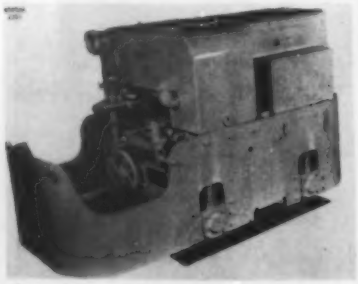
PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill or smelter. This PEP section is MINING WORLD's way of making available to you some of the finest current information on mechanization.



Cummins Makes New Turbodiesel Engine

A new lightweight, 175 horsepower Turbodiesel has been announced by Cummins Engine Co., Inc. This new Turbodiesel designated the JT-6, is a six cylinder, in-line type with 4⅛-inch bore, 5 inch stroke and displacement of 401 cubic inches. Installed in a truck, the JT-6 Turbodiesel weighs only 1,615 lbs. or 9.2 lbs. per horsepower. The JT-6 Turbodiesel weighs 800 lbs. less than other Cummins Diesels of equivalent horsepower, and is comparable in weight to gasoline engines of similar power.

Company officials believe that the development of JT-6 Turbodiesel represents one of the most important milestones in Diesel History. For further information circle No. 80.



Mancha Offers 2-Ton Diesel Locomotive

The Mancha Storage Battery Locomotive Division, Goodman Manufacturing Co., Chicago, Illinois, has added a 2-ton Diesel powered unit to its line of locomotives. Suitable for either 18-inch or 24-inch gauge track this new unit has been designed for continuous service where haulage demands do not exceed 1,000-pounds drawbar pull. The engine is a Hercules 2 cylinder, 4 cycle type rated at 30 hp, 1800 rpm, at sea level to 1,500-feet elevation. Featured is an air cooled, automatic hydraulic torque converter, also a water exhaust scrubber. Circle No. 52 for full details.

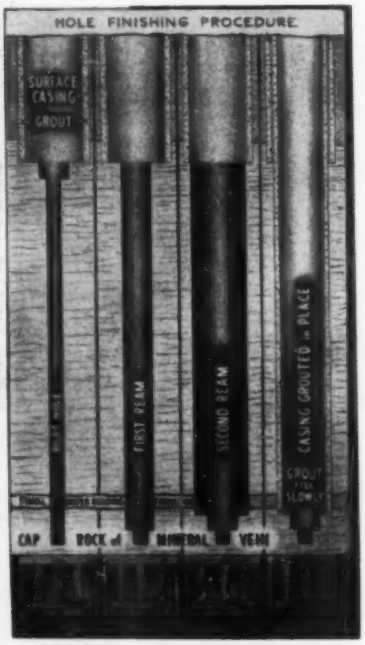
Hough's Third New Four-Wheel-Drive Payloader

The third and largest of the new Frank G. Hough four-wheel-drive Payloader tractor-shovel line is now on the market. This new 2 cubic yard capacity Payloader features a new "power shift" transmission thus eliminating the clutch pedal, "pry out" bucket action, greater horsepower, and more weight. Underslung design and position of the boom-arm gives the driver new safety and visibility. Many optional features for the loader are available. Circle No. 60 for more information.

Scintillation Counter For Oil-Uranium Prospecting

Oil and uranium prospectors can now obtain precise, minute radio-activity measurements with the new Royal Scintillation Counter offered by the Radiac Co. of New York. These minute readings are all-important because extremely small differences in background count, plotted on a grid map, often delineate oil structures and indicate deeply buried uranium deposits. A large scintillation crystal, fast counting circuit, and the incorporation of both a scaler and ratemeter make this possible. The ratemeter measures the average number of radiation pulses received at any given time, while the scaler actually counts the pulses in a given period of time.

The Royal can be used for aerial, mobile, and ground surveys. It has four time constants (1, 5, 15, and 45 seconds) which enable the prospector to take very rapid readings when traveling at high speeds, and critically precise readings when making grid surveys. Obtain further information by circling No. 68.



Drill-Ream Method for Drilling Large Holes

The Drill-Ream method used for boring pilot holes for shafts, large diameter ventilation holes or cableway hole-connections to existing drifts is described in a bulletin by Spang & Company of Butler, Pa. Entitled "Churn Drill Tools for Blast Holes," the bulletin describes the all Spang blast hole tools and gives helpful hints on dressing and hardening cable tool bits. It also lists the causes and cures for battering of bits, watercourse splitting, and cracking and chipping. For your copy of this informative bulletin, circle No. 4.

ALL ABOUT JIGS: "Low Cost Gravity Concentration (of fines as well as coarse minerals) with Denver Jigs" is the subject of a new bulletin published by the Denver Equipment Company. The bulletin presents the facts about Denver Selective Mineral Jigs designed to handle unclassified, unsized feed. Circle No. 7 for your copy.

NEW CHAIN HOIST: Two light but powerful coil chain ratchet hoists have been introduced by Coffing Hoist Division, of the Duff Norton Co. The two new models have 1½-, and 3-ton capacities. Reduction in the hoists is achieved through specially-designed compound levers instead of gears. Circle No. 8.

NEW BULLETIN: Allis-Chalmers two-stage pumps for boiler feed and other high pressure applications are described in a new bulletin released by the company. The pumps are available in close-coupled and frame-type construction in capacities to 300 gpm at heads of from 300 to 550 ft. at temperatures up to 250° F. Circle No. 9 for your copy.

pH EQUIPMENT price list has been released by the Bristol Co. of Waterbury, Conn. A new price list and specification bulletin on their pH recorders and controllers for use with Beckman electrodes and amplifiers is now available. Specifications are written to enable a user to select the pH indicating, recording, or automatically controlling equipment best suited to his particular needs. For a copy Circle No. 10.

MAGNET BULLETIN: The Ohio Electric Mfg. Co., manufacturer of a complete line of lifting and separation magnets and magnet control equipment, announces a new four-page bulletin on Ohio Super Magnetomotive rectangular separation magnets. This illustrated bulletin is yours by circling No. 11.

FLUORSPAR FLOTATION. A recent issue of Denver Equipment Company's publication Trefoil contains an interesting study of a 125-ton fluorspar flotation mill, as well as many other interesting metallurgical items. Circle No. 12 for your copy.

POWER SHOVEL: Baldwin-Lima-Hamilton Corp. announce the availability of descriptive bulletin (#204), covering its recently introduced one-half cubic yard power shovel, 13 to 15-ton capacity crane, known as the LIMA Type 24, JOB-MASTER. The bulletin, illustrates and describes the machine's applications—shovel, crane, dragline or pull shovel with crawler, wagon or truck mountings. Circle No. 13 for your copy.

HYDRAULIC STARTER for Diesels developed by General Motors. A new hydraulic starting system for Diesel engines, which assures split-second starting even under adverse weather conditions, has been developed by General Motors. The unit has been field tested and is now available for installation on new GM Detroit Diesel engines. Circle No. 14.

URANIUM PRICE CHART: Send for free uranium price chart and catalogs offered by The Radiac Company Inc. Their literature includes information on a new 1" diameter scintillation counter, a scintillation detector designed for one-man prospector, and other types of radiation equipment. Circle No. 18.

CERAMIC GRINDING PLATES: Bico, Inc. has now available a new type laboratory grinding plate, made of alumina ceramic. Recent tests made with these plates indicate that the plates produced 100-mesh samples that were practically zero in contamination. Circle No. 19 for more information.

DENVER JAW CRUSHER: Denver Equipment Company has introduced the new 36- by 48-inch Tupe "J" Denver Jaw Crusher to meet operators primary crushing problems. Estimated capacity of crusher is 275 to 750 tons per hour, depending on type of rock and discharge setting, which varies from 4 to 10 inches. For more information Circle No. 20.

NEW SYNTRON SCREEN: An economical and effective medium for high capacity scalping and rough sizing operations is now provided by the new Syntron "Pulsating Magnet" Vibrating Screens, manufactured by Syntron Company, Homer City, Pa. Circle No. 22 for further information.

SCINTILLATION PROBE: The Mt. Sopris Instrument Corporation announces its new Scintillation Counter Gamma Hole Logging Probe and Ratemeter. Used with your hoisting equipment for detection of uranium, stratigraphy, lithology, and potentially for in-hole spectrometry. Send for literature on this. Circle No. 23.

BLUE BRUTE 600: An all-new portable rotary compressor, the Blue Brute 600, has been placed on the market by the Worthington Corporation. The model features a new type clutch, self draining facilities, two-stage oil separator, shorter wheel base, and other features. Circle No. 24.

NEW OIL CLUTCH, now available as an attachment for D4 Tractors, has been announced by Caterpillar Tractor Co. The new D4 oil clutch is similar in design to the oil clutches in the D6, D7, D8, and D9 Tractors. It features metallic-faced clutch discs, a self-contained gear-type pump and oil supply clutch brake for easy shifting. Circle No. 25 for more information.

EASY SHAFT MUCKING is now possible with the Cryderman shaft mucker. Operated by one man, the air powered controlled bucket and telescopic boom can reach out in any direction. Similar to a human arm and hand, the mucker goes into the muck with force and is able to handle large boulders, as well as fine muck. Circle No. 27 for details.

WORLD'S LARGEST WINCH: Availability of a new Hyster towing winch, which according to the company is the world's largest, has been announced. The winch is of matched design for the new Caterpillar D9 crawler tractor and develops a line pull of 76,000 lbs. Circle No. 29 for bulletin and additional information.

"PROFIT PRODUCERS in Pit and Quarry" is the title of a new 12-page booklet recently published by the Caterpillar Tractor Company. How to get volume production at less cost per ton is the subject matter of this brochure which is available in French, Spanish, and Portuguese. Circle No. 31 for your copy.

NEW CATALOG covering prices and specifications of its new tool holders for "Throw-away" carbide inserts was issued recently by Carboloy Department of General Electric Company, Detroit. Circle No. 34 for your copy.

HYDRA-BOOM BULLETIN: Ingersoll-Rand announces a new 12-page Hydra-Boom Bulletin covering its complete line of hydraulic booms for use in the mining industry. It contains information on booms mounted on tractors, tunnel jumbos, and self-propelled air operated rigs. Circle No. 38 for your copy.

CAP LAMP: A new four-page brochure, which describes the Edison R-4 Electric Cap Lamp, has just been published by Mine Safety Appliances Company. The R-4 miner's lamp, a product of Edison and MSA research, and the exclusive nickel-iron-alkali Edison battery which

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powers it are shown in photographs, detailed drawings, and cutaway sketches. Circle No. 39 for your copy.

BELT CONVEYOR IDLERS: E. F. Marsh Engineering Co. has designed a catalog featuring essential information on the selection, application, and mounting of its line of belt conveyor idlers. This booklet helps to answer problem of finding the exact idler to meet normal and unusual needs. Circle No. 40.

IN SPANISH: Available now to interested technical people is a booklet written in Spanish called "Exploracion Geofisia Levantamiento Magnetometrico." The booklet deals with exploration geophysics by use of the airborne magnetometer. Explanations, formulas, and maps are included. For your copy circle No. 41.

NEW WORTHINGTON ENGINE: The Worthington Corporation has recently announced production of the entirely new W-9 engine with Jet Swirl power. For economy and efficiency the W-9 is capable of using lowest cost fuels available. The Jet Swirl feature enables air to enter the cylinder and impart a turbulent swirling motion to the air, assuring intimate and rapid mixing of the air and fuel. For more information Circle No. 47.

MILL DISCUSSION: The operation of an up-to-date flotation plant to recover lead-zinc from tailings of an abandoned mine is discussed in an 8-page Engineering Notebook Section in a recent issue of "Deco Trefoil" published by Denver Equipment Company. Circle No. 48 for your copy.

HEAVY DUTY MOTOR GRADER: Allis-Chalmers is introducing the Forty-Five Motor Grader, a new heavy-duty unit powered by the new Allis-Chalmers ADS-516 six-cylinder, 4-cycle Diesel engine with its rated 120 maximum brake hp, at 1600 rpm. Circle No. 49 for further information on this new grader.

NEW TRUCK CRANES: Five new truck-crane models, ranging from 12½- to 35-ton lifting capacity, are now being offered by Link-Belt Speeder Corporation. Called Zephyrcranes because of their speed in moving from job to job, they are said to offer industry new highs in lifting and digging efficiency. Circle No. 50 for further information.

ROTARY DRYER: Now available from the Hardinge Company is the Ruggles-Cole XH-XF Portable Pilot Plant or Laboratory Rotary Dryer. This Dryer is a single shell, direct fired, rotary dryer, designed especially for laboratory use. It is applicable also for small capacity unit processes requiring a intermittent, or continuous drying step. Circle No. 51.

ONE YARD PAYLOADER: The Frank G. Hough Company announces its new model HAH "Payloader". This new "Payloader", scheduled for production in January 1956, features a bucket breakout action, which permits 40° of tip-back at ground level. For complete information and literature Circle No. 42.

FREE HARDNESS CHART: A chart which shows the approximate relation between hardness by various testing systems, and tensile strength of carbon and alloy steels, has been issued by the Tubular Products Division of the Babcock & Wilcox Company. For your data card circle No. 43.

CARBIDE TIPS: A line of carbide stone cutting blanks specifically designed for tipping stone cutting tools is announced by the Carboloy Department of General Electric Company, Detroit. The carbide blanks will be made in a wide variety of standard sizes and shape. Circle No. 44 for information.

OXYGEN ANALYZER: A new brochure from the Arnold O. Beckman Company describing their new Model F3 Oxygen Analyzer is now available. The brochure describes the analyzer in detail, showing how the F3 makes its measurement directly upon the oxygen content of the gas, not upon some remote secondary relationship. Circle No. 45 for your copy.

TWO NEW RIPPERS, one a Ransome R-78, the other a Ransome R-46 Ripper, have been introduced by the Ransome Corporation, of Philadelphia. These Rippers are designed to fit tractor-bulldozer blades of any make, and can be used for many applications. Circle No. 46 for more information.

FLANGE BELTS: The Dura-Belting & Manufacturing Co. has now available Dura-Flexion Flange Belts. According to the manufacturers, a 14-inch conveyor belt with a 2-inch high Dura Flanges will carry approximately 60 percent more material than a 14-inch wide troughed belt or the equivalent load of a 20-inch wide troughed belt. Circle No. 53 for more information on this belt.

COMPRESSOR INFORMATION: A brochure on air compressors from 1/3 to 20 hp has been published by the Export Division of the American Brake Shoe Company. Describing products of Brake Shoe's Kellog Division, this illustrated booklet is available in both English and Spanish. It covers pumps and tank mounted systems, single and two stage, gasoline and electric driven compressors. Circle No. 54 for your copy.

TORQUE CONVERTOR DRIVE: The American Tractor Corporation has announced two new developments in the low-priced crawler tractor field. A new all-hydraulic instant-shift transmission and torque convertor drive. Effortless control and easy maneuverability are direct results of these new features. Circle No. 55 for further information.

TUBE TULE: The Double T Products Co., Hawthorne, California, has announced the production of the "Tube Tule". With the use of this tool pipes and tubes up to 4½" ID may be quickly and safely installed or removed. Using a principle of internal expansion, pipes may be worked on without marring the surface, and in places where external wrenches could not be applied. For further information circle No. 57.

TURBODIESEL ENGINES: A new booklet now available from the Cummins Engine Company, Inc. explains the principles involved in turbocharging as applied to Cummins Diesels. This illustrated booklet is yours if you circle No. 58.

A CONDENSED CATALOGUE No. 5510, containing fifty pages of technical data, brief description and photographs of vibratory equipment, feeders, conveyors, power tools, shaft seals, selenium rectifiers, diesel pile hammers, gasoline hammer drills, electric hammers and other materials handling equipment, has been published by the Syntron Company. For further information Circle No. 26.

LARGER PIONEER CRUSHER: A new size of twin roll crusher which will increase production 33 1/3 per cent over its smaller counterpart without an increase in price, is now being made by Pioneer Engineering Works, Inc. The crusher has rolls 30 inches in diameter, and 24 inches in width, with a capacity of up to 254 tons per hour. Circle No. 30 for information.

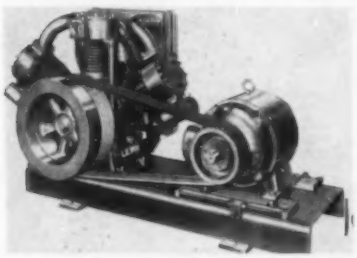
MULTI-PURPOSE COUNTER: The Mount Sopris Instrument Corporation announces their new portable scintillation counter with hole probe and alarm meter attachments. With this one unit it is possible to conduct surveys by foot, car, and also do bore hole exploration. Circle No. 21 for more information.

For Free Product Literature see other side

IH New Payscraper Features Power Boost

A boost in engine power to 262 Horsepower is a feature of the new International 75 Payscraper, now being introduced by the International Harvester Company. To take care of the additional power boost the whole power train has been strengthened.

The Payscraper is the largest high-speed, rubber-tired earthmover in the International line. With this 262 horsepower Diesel engine, it can scoop up an 18-cubic-yard heaped load, then high-ball along haul roads or up hills at more than 24 miles per hour. Obtain further information by circling No. 77.



A Stationary Compressor Line Announced By Le Roi

A new line of two-stage, air-cooled, electric motor driven compressors has been announced by the Le Roi Division of Westinghouse Air Brake Company. These new 50, 75 and 100 hp stationary compressors have displacements of 260, 415 and 550 cfm at 125 psi operating pressure.

Ideal for applications where compactness, light weight and a minimum of operator attention are required, the new 3 cylinder 50S2 and 6 cylinder 75S2 and 100S2 compressors have a balanced design which reduces vibration and noise to a minimum. This prevents wear of both compressor and motor and lessens operating noise. Circle No. 75 for further information.

New Euclid Scraper Has Four-Wheel-Drive

Euclid Division of General Motors Corp. is now in production on two new overhung engine type scrapers. Each has a struck capacity of 18 cubic yards, and utilizes Allison Torqmatic Drive consisting of torque convertors and semi-automatic transmission. Torqmatic Drive completely eliminated clutching and permits the operator to change from one speed range to another under full power.

The Twin-Power model TS-18 Scraper has two 194 hp engines, one driving the tractor wheels and the other providing power to the rear wheels. The Model S-18 is powered by a 300 hp engine and has 27.00 by 33 tires. Full 90° steer permits both models to make 180° turns in 35 feet or less. Circle No. 79 to obtain further information.

HTL Announces New $10 Miniature Seismometer

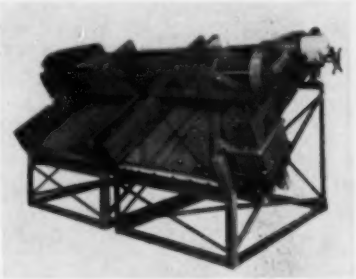
Houston Technical Laboratories announces the new dualDAMP miniature seismometer weighing less than a pound, with a purchase price of $10. The S-39 dualDAMP is a velocity type seismometer especially designed for multiple array use in land exploration.

The S-39 has been named the dualDAMP because it employs both electromagnetic and fluid (Dow Corning Type 200) damping. The seismometer has undetectable spurious response and high lateral stability up to 500 cps, and it has been tested from —60°F to 150°F with negligible change in damping. This feature ideally suits the S-39 to high frequency, high resolution operations. For more information circle No. 3.

New Excaloader Features Low Overhead Clearance

A new loading attachment is now available for underground mining and general bulk materials handling. Called the Excaloder, it adapts the new Link-Belt Speeder heavy duty one-yard LS-98 shovel-crane for horizontal, straight-line loading operations.

The Excaloader is an attachment that is interchangeable with the shovel, hoe, dragline, clamshell or crane attachments for the LS-98. It features exceptionally low overhead clearance; standard mast requires only 15-feet, 10-inches clearance height. An optional low mast has minimum clearance height of only 11-feet, 3-inches. Maximum dumping height, with stick extended at 45°, is 16-feet, 11-inches, and with stick retracted at 45°, is 11-feet, 4-inches. Circle No. 70 for further information.



Newly Engineered Design for Dual Heated Screen

Many problems are presently coming up necessitating the screening of fine granular materials. Such jobs mandate the use of electric jacket heating.

Recent installations of Leahy screens are paired, and for this type installation an arrangement was designed, whereby two screens are operated from a single 20 KVA heating transformer. With a single screen installation, the resistance provided in its screen cloth and the electrical requirements call for employment of a 15 KVA transformer. It is apparent that two screens heated with a single transformer represent a saving in equipment cost. Also, the two screens heated by the single transformer will obtain maximum heating results in their jacketing. For more details, circle No. 1.

Belt Conveyor Suspended Between Taut Wire Ropes

A radical departure from the conventional style rigid structural frame belt conveyor for mine use is offered in the new Rope Belt Conveyor introduced by Goodman Manufacturing Company, Chicago. The conveyor belt is carried on chain-linked idler rolls suspended between taut parallel wire ropes. The company states the flexibility of the linked idlers and of the ropes insures shock-free belt travel from start to finish. The idlers and ropes conform to the load rather than forcing the load to conform to a definite contour or position. The parallel ropes form true alignment between anchor points and the self-aligning idlers maintain belt alignment. The rope conveyor conforms to uneven mine bottom and for above ground use can be suspended over gullies or roads. For the full story, circle No. 2.

This Tough, Trouble-Free Belt Takes Heavy Loads In Stride

Here's an economical, tough belt for hauling heavy loads of coal, ores or aggregates in operations where long conveyor centers are necessary. Its troughability is good and its fastener holding is superb.

A sturdy, multiple-ply, rayon duck carcass makes this belt lighter and thinner than cotton-carcass belts of comparable strength. Skim coats between plies insure perfect bonding.

Like other heavy duty belts, these LOADLINER belts are custom made to meet particular requirements of individual jobs — unlimited length, widths to 72". They can be made with a cover tensile strength of 3500 to 4000 pounds average and a friction pull of 20 to 24 pounds; or with a cover tensile strength of 2500 to 3000 pounds and a friction pull of 16 to 19 pounds; also available in oil-resistant Neoprene. All are mildew inhibited throughout. A breaker strip can be included in top cover, if specified.

We also manufacture a complete line of industrial rubber products: belting, hose, packing and moulded rubber of every construction for every need. *Through your Quaker and Quaker Pioneer distributor* our research and engineering services are always available to help you solve any industrial rubber problem. *Write for name of nearest distributor.*

DIVISIONS OF HKP H. K. PORTER COMPANY, INC.

QUAKER RUBBER CORPORATION
Philadelphia 24, Pennsylvania

QUAKER PIONEER RUBBER MILLS
San Francisco 7, California

Colorado Convention Plans Big Machinery Exposition

The Colorado Mining Association and affiliated groups have scheduled their annual National Western Mining Conference for February 2 through 4 in Denver, Colorado. Two sessions, technical, and industry affairs, will be held simultaneously in the Shirley Savoy Hotel and Mile High Building to accommodate the nation-wide gathering of miners.

With the greatest request ever for exhibition and display space by manufacturers and equipment firms, arrangements have been made for an outside machinery exposition in the plaza and open air garden surrounding the Mile High Building. The entire transportation building of the Mile High Center will house the indoor exhibits.

John Daly, master of ceremonies of the TV program "What's My Line," has been invited to preside at the world famous Sowbelly Dinner which winds up the convention.

D. W. Viles, vice president, Vanadium Corporation of America will be convention chairman. Vice chairman will be Harry McNeil of Stearns-Roger Manufacturing Company, and Clyde Johnson of Denver Equipment Company.

Moab Area May Be Site Of Big Potash Operation

Delhi-Taylor Oil Corporation of Dallas, Texas is conducting intensive core drilling operations on 8,000 acres in Grand County, Utah on which the company holds potash rights. If results prove favorable, the firm plans a potash mining and reduction operation near Moab, estimated cost of which ranges from $12,000,000 to $20,000,000. The drilling program has been conducted seven miles from Moab.

To tap the potash reserves developed to date, it will be necessary to sink a main shaft to a depth of 3,000. This would make the project one of the deepest in the United States. If the plant is constructed, the potash will be distributed in the eleven western states, the Midwest, and the southern United States. J. W. Bartlett is head of Delhi-Taylor's chemical division.

Uranium Ore Search Leads All Other Minerals in U.S.

The United States' search for uranium has topped all other minerals with the exception of petroleum. A report from the United States Geological Survey states that the number of geologists employed by government and industry in this field is larger than the total number of geologists engaged in the study of all other minerals combined, with the exception of oil. Largest part of this search has been in the western states, and the outlook for future discoveries, especially in sandstone and vein deposits in the Rocky Mountain states, is reportedly bright.

A copy of the USGS survey on the "Search for Uranium in the United States," complete with maps and prospecting references, may be obtained by sending 25 cents (for Bulletin 1030-A) to the Superintendent of Documents, Government Printing Office, Washington 25.

The *American Gilsonite Company* has awarded the first two contracts involving its new gilsonite coke and high test gasoline plant to be built in the Grand Junction, Colorado area. *Foster Wheeler Corporation*, New York City, will build the delayed coking plant, and *Kaiser Engineers*, Oakland, California, received a contract for the calcining plant, utilities, and auxiliary facilities. Expansion of mining operations at Bonanza, Utah is already underway.

Climax Molybdenum Company has started construction of an additional unit to its mill at Climax, Colorado. The addition will be used either to increase recovery of molybdenum by approximately three percent with no increase in tonnage treated, or to operate with an increase of 3,500 tons of ore per day on the present recovery basis. Climax is now producing a total of 30,000 tons per day, including approximately 5,000 tons of ore from low-grade deposits.

W. L. Davenport and Frank Gross are reopening the *Minnie Tunnel* at the *Minnie* mine near Breckenridge, Colorado. The partners plan to begin shipping lead-zinc ore immediately. In addition, an exploration project involving opening of the *Ice Tunnel*, 300 feet lower than the major workings, has been started. Objective is to cut the Robley vein, known to have high values in lead, at least 250 feet deeper than in earlier operations. Mr. Davenport, who is in charge of work at the Minnie, recently sold his lease on the *Wellington* mine to his two partners in that operation, Harold Horn and Marvin Burger.

Several uranium firms have announced exploration plans for the Brown's Park area northwest of Craig, Colorado. *American Leduc Uranium*, New York City subsidiary of *Penn Canadian Oil Company*, has taken 325 claims and 10 school sections on which it will complete a $200,000 drilling program by June 30, 1957. The *Thornburg* interests are currently drilling south of Lay, Colorado, near Juniper Mountain. *Utah Construction Company* is drilling in the area and has farmed out a drilling project to Bill and Tony Antonides. *Moffat Mining Company* is also active in the area.

Shiprock Mining Company, California, has purchased the *Good Friday* and *April Fool* mines in Boulder Canyon, Colorado from George Jump, who has operated the two tungsten properties for many years. Extensive development is planned, including construction of a new mill. Jack Sullivan of Culver City, California is in charge.

Tech-Ser Mining Company has leased the *Silver Ledge* mine, an old lead-zinc producer in the Chattanooga, Colorado mining district of San Juan County, and mining operations are now underway. The new company, composed of *Black Mining Company* and *Technical Services, Inc.*, has a four and a half year lease on the property, which includes eight patented claims, three possessary claims, and five millsites. In the past 10 years a net profit of more than $25,000 from sales of lead-zinc-silver ore has been realized from the mine. It is owned by Joseph M. Bradley of Silverton, Colorado, and for a while was worked by the *American Zinc, Lead, and Smelting Company*.

Three Forks Oil and Uranium Company reports that it hopes to build a 200-ton-per-day uranium processing mill at Steamboat Springs, Colorado. The town board has voted to give the firm 30 acres of city-owned property as a site for the mill when an investment of $1,00,000 has been made by the company.

A rich lead-silver deposit has been reported by three men in the Marble, Colorado area. The *Little Darling Mine* produced $5,000 worth of ore between August and October of last year, and ore mined this summer was valued at around $65.00 per ton. The vein cutting solid marble, varies from 18 inches to 15 feet in width. Operators of the mine are MacDonald Knight, Olathe; Leonard Hammock, Gunnison; Lionel Azoulay, Olathe.

Rico Argentine Mining Company's 200-ton-per-day contact sulphuric acid plant is now in operation near Rico, Dolores County. Cost of the new plant has been estimated at $1,400,000, which is $100,000 less than the original estimate. Tailings ponds at Rico contain some 250,000 tons of concentrated pyrite (lead-zinc tailing), which are expected to supply sufficient material for plant operation for several years. The firm eventually plans to mine and convert approximately 15,000,000 mineable tons of ore containing 50 percent sulphur. *Leonard-Monsanto* were general contractors for erection of the mill and have also been assigned to place the plant into operation.

The *Rainbow Uranium* mine, five miles north of the *Hidden Splendor Mining Company* operation in Emery County, Utah, shipped its first load of ore October 7 to the *U.S. Atomic Energy Commission* ore buying station at Green River, Utah. By the end of October 60 200-foot holes had been drilled. The operation is a partnership of Burt Sanford and Del Peterson, Van Nuys, California.

Western National Company, Ltd. has purchased a location near Monticello, Utah for erection of a $150,000 metallurgical laboratory. Work will start early next year. The company recently bought 17 uranium claims in the Big Indian Wash south of the *Mi Vida* mine. It also owns 200 uranium claims northwest of Blanding, Utah. Grover C. Moore is chief consulting geologist and engineer for the company.

Bleak Uranium Company, which plans to make its headquarters in the new Uranium Center now under construction in Green River, Utah, has begun shipping from its *Piccolo Pete* properties in the White Canyon area. The operation is ten miles from the *U.S. Atomic Energy Commission* buying station at White Canyon.

Standard Uranium Corporation, Moab, Utah, reports net profits of $479,266 for the nine months ended September 30, 1955. Shipments of 68,398 tons of uranium ore were made to the Moab buy-

ing station during this period. The firm holds properties in the Big Indian District of San Juan County, Utah, including the *Big Buck* claims.

At the *Mountain Lion* claims, San Juan County, Utah, mineralization has been improving as drilling has progressed easterly. A fourth hole was being drilled at last report. The work is being done by *National Uranium Corporation* of Idaho under a contract with *Silver Buckle Mining Company*, Wallace, Idaho.

Between 2,000 and 10,000 feet of rotary drilling will be done at the *Dead Horse Point* property, San Juan County, Utah, under a contract awarded *Minerals Engineering Company* of Grand Junction, Colorado. The property is being developed jointly by *Nabob Silver-Lead Mining Company*, Wallace, Idaho; *Merger Mines*, Coeur d'Alene, Idaho; and *Bismarck Mining Company*, Spokane, Washington.

Utaco Uranium, Inc., Moab, Utah, has begun shipping ore from its Coyote Wash mine in Lisbon Valley, San Juan County, Utah. The mine is located on one of the 104 claims recently acquired by Utaco from the *Mohler Brothers* and *Jack Turner* of Moab. Drilling on the firm's Red Canyon properties has outlined the *Allen No. 2* ore body. A 288-foot incline shaft is being sunk at the Allen No. 2 to reach the ore body. Handling all Utaco mining operations is Everett Blackburn, former mine foreman for *Vanadium Corporation of America* and field supervisor for Jack Turner and associates.

Vitro Uranium Company, division of *Vitro Corporation of America*, and *Shumway Uranium Mining Company*, Blanding, Utah, have signed an operating agreement pointing to erection of an eventual processing mill near Blanding. The firms are interested in building a mill to serve the Elk Ridge district, but any future plans are dependent upon an ore reserve evaluation, in which *Vitro Minerals Corporation* will also participate.

Atomic Resources Corporation, Dallas, Texas, has two rigs engaged in core drilling on the *Waterfall* group of claims 20 miles northeast of Monticello, Utah. The firm is also checking dumps on the property from a previous vanadium operation for uranium ore. Work is under the direction of Carl I. Dismant and Howard Milligan. *Santa Fe Western Gas & Uranium Company* owns an interest in the project. About 15 tons of 0.51 percent ore is being shipped daily to the Monticello, Utah mill of the *U. S. Atomic Energy Commission*.

Monte Carlo Uranium Mines, Salt Lake City, Utah has reported that *Vitro Minerals Corporation* has probed seven line holes on Monte Carlo's claims 14 miles southwest of Green River, Utah. Ore ranging in thickness from one foot to seven feet and running from 0.30 to 0.92 percent U_3O_8 was reported.

Alunite Corporation of Utah plans to erect a pilot plant and storage facilities at Marysvale, Utah at a cost of $20,000. The plant will produce 25 tons of pulverized alunite per day for use as a fertilizer ingredient. The firm has already signed a contract with the *Rocky Mountain Mining and Development Company* to deliver 20 cars of the material within 90 days. G. Owen Lovejoy is president of the Salt Lake City firm.

The 160-claim *Ransom* uranium property in San Juan County, Utah's Cottonwood Wash area has been sold to two Wallace, Idaho firms—*Uranium Discovery and Development Company* and *Uranium Prince Mining Company*. The purchase contracts, with an end price of $5,455,000, were turned over to the Wallace firms by Jay Bettles. The operating *Ransom Brothers Mining Company* of New Mexico has been shipping about 50 tons of ore daily under a lease option. The Idaho firms also have holdings in the Big Indian and Hatch Wash districts. R. J. Bruning, Wallace, is president of both companies.

Fourteen mining claims in Taylor canyon, about 50 miles from Moab, Utah have been acquired by *Lewis-Clark Uranium Company* of Kamiah, Idaho. Core drilling is under way. Jim Danielson, Kamiah, is president.

WYOMING

Mile High Minerals, Inc. of Denver, Colorado recently purchased six uranium claims in the Crooks Gap area of central Wyoming for $15,000. The claims were purchased from six Rock Springs, Wyoming, prospectors. The claims adjoin 12 others the company purchased last year from the same men.

An intensive test drilling program calling for more than 20,000 feet of drilling has been started on a group of claims in the Green Mountain area near Crooks Gap in central Wyoming by the *Plunkett Uranium Mining Company*, of Lander, Wyoming, and Chicago, Illinois. The program is expected to require several months.

United Uranium, of Chicago and Riverton, has started a drilling program on a group of claims in the Gas Hills area of Fremont County, Wyoming. Joe Bode, general manager, reported that approximately 10,000 feet of drilling will be done in the initial program.

Dravo Corporation has begun the $1,300,000 shaft program at *Intermountain Chemical Corporation's* trona mine near Green River, Wyoming. The 1,600-foot shaft will provide increased ventilation for the company's mechanized underground workings.

Loma Uranium Company reports that assays of 65 tons of ore from its property 25 miles northwest of Douglas, Wyoming, show 0.42 percent U_3O_8 content. An average daily production of 25 tons has been maintained at the mine.

Cheyenne Mining and Uranium Company, Omaha, Nebraska, is shipping ore from two new mining operations in Wyoming. The *Osiris* mine is located ½-mile east of the company's Cochon mine on Beaver Rim, which has been shipping since June. The second operation is on the *Pat* claims in the Gas Hills. Cheyenne holds 23 claims in the Pat group.

Lost Creek Uranium & Oil Company, Rawlins, Wyoming, plans to apply to the *U.S. Atomic Energy Commission* for construction of a uranium processing mill. Company president Bob Adams reports that an ore body containing an estimated 50,000 tons of ore has been blocked out on the *Sno-Ball* claims. Approximately 80 tons per day are being shipped from the claims to the AEC buying station at Riverton, Wyoming. The company also holds leases on the adjoining *Bessie McIntosh* claims and on 3,000 acres in the Pumpkin Buttes area.

Mining operations have been started by *San Juan Uranium*, Denver, Colorado, at the *Hazel* claims in the Crooks Gap area of southeastern Fremont County, Wyoming, following settlement by court action of recent litigation. San Juan is mining under terms of an exploration-mining agreement with *Mountain Mesa Uranium Corporation*, holders of a lease from owner Lawrence J. Bergsten. Mr. Bergsten was successful in establishing quiet title to his claims, winning an overstaking suit against Hepburn T. Armstrong, Lander, and associates.

Pacific Isle To Operate Two Republic Steel Mines

The Pacific Isle Mining Company of Hibbing, Minnesota has completed negotiations for the purchase of the St. Paul-Day mine, Keewatin, and the Stevenson mine, near Hibbing, together with plants and equipment used in connection with their operations from the Republic Steel Corporation in Cleveland.

Both mines are on the Mesabi Range and are former properties of Corrigan McKinney Steel Company and were acquired by Republic in 1935 along with other plants and properties of Corrigan McKinney.

The St. Paul Day mine was operated by Republic in connection with the St. Paul mine. Available tonnage listed in 1952 was 509,179. The 1953 Minnesota Mining Directory listed available tonnage at the Stevenson at 543,738 tons.

Reynolds Metals Company has undertaken an $11,000,000 expansion program at its aluminum reduction plant at Listerhill, Alabama. Plant capacity will be increased from 100,000,000 to approximately 140,000,000 pounds of primary aluminum annually. The expansion is to be completed during the summer of 1956 without shutting down the plant at any time. Also included in the expansion will be an increase in the productive capacity of the carbon-paste plant, and the construction of an experimental potline to develop new types of pots by testing. The latter will require a new $2,000,000 building. It will produce 3,200,000 pounds of aluminum annually, and is scheduled for completion by February of 1956.

Calumet & Hecla, Inc. has transferred approximately 230,000 acres of timber lands and non-mining properties of its *Calumet Division* to a newly created Forest Industries Division. The transfer includes tracts of land in Keweenaw, Houghton, Ontonagon, and Marquette counties of Michigan, and specifically excludes the actual mining properties in this area.

Fansteel Metallurgical Corporation of North Chicago, Illinois is continuing to buy tantalite ores for its own production of pure tantalum metal, although the government stockpiling of tantalum-columbium ores has been substantially completed. The firm states that its primary interest is in ore concentrates containing at least 30 percent tantalum oxide, but offers of lower grade ores will be considered.

Local citizens of Hancock, Michigan are attempting to persuade the management of the *Quincy Mining Company* to reopen the firm's copper mine at Hancock now that the demand for copper is increasing. Meanwhile, the management is removing timber and debris from the *Quincy* mine No. 5 shaft so that examination and geological work can be carried on.

Almost all of the required machinery for operation of the *Carolina Mines, Inc.'s* new kyanite extraction plant has been purchased and is en route to the plant site, according to Peter E. Peterson, general manager. The plant will be located near Kings' Mountain, North Carolina. George A. Spake of Shelby has been named construction superintendent. The firm holds 261.5 acres of land in Gaston county.

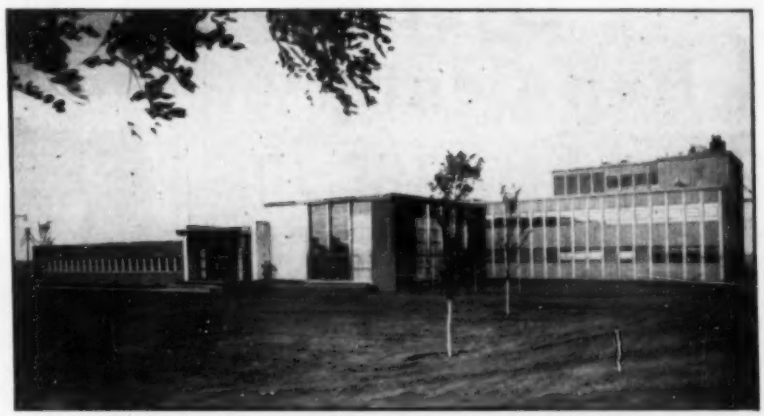
Virginia Mining Corporation reports that sufficient lead-zinc-copper ore has been discovered at its property at Dillwyn, Virginia to constitute a mine. The company has been working under a Defense Minerals Exploration Administration loan, and under its contract, the company will now be called upon to repay these advances out of production. Last spring, the company reported that it had 405,872 tons in two zones, with average grade of 0.74 percent copper, 1.01 percent lead, and 3.04 percent zinc. Since then, an airborne electro-magnetic survey has outlined 51 anomalies in an area 20 miles long by 10 miles wide, with 39 considered to be of major size. Diamond drilling has now been undertaken on some of the most favorable zones.

Pittsburgh, Pennsylvania oil capitalists interested in uranium recently had Marshall Haney, consulting mining engineer of Kensington, Maryland, make a preliminary survey of a large acreage of low-grade uranium in shales in Ohio.

Carborundum Metals Company Inc. of Akron, Ohio has submitted a proposal to the U.S. Atomic Energy Commission to supply 2,000,000 pounds of zirconium over a five-year period. If the company gets the contract, it plans to build a new plant or expand the present one.

The *Defense Minerals Exploration Administration* has approved several contracts for mica exploration in North Carolina. The contracts were awarded as follows: W. C. Crotte, Cleveland County, $3,664, government's share $2,748; Paul Freeman, Mitchell County, $4,464, government's share $3,348; C. R. Phillips, Mitchell County, $4,304, government's share $3,228; C. R. Phillips and Brown Sparks, Mitchell County, $4,316, government's share $3,237; Richmond Thomas, et al, Mitchell County, $4,464, government's share $3,348; Buchanan & Snyder, Yancey County, $4,764, government's share $3,573; Walter Grindstaff, et al, Yancey County, $4,464, government's share $3,348; *Non-Metallic Minerals Corporation*, Yancey County, $5,428, government's share, $4,071.

The last week in October marked the end of the regular operating season for most beneficiation plants on the Iron Range. Repair and modifications began at once looking toward another busy season in 1956. The 1955 season started slowly but as demand for steel increased



J&L Dedicates $1,500,000 Research Laboratory

Jones & Laughlin Steel Corporation has dedicated its new $1,500,000 Graham research laboratory on Baldwin Hill, Pittsburgh, Pennsylvania. The lab has been named for Herbert W. Graham who was vice president-research before becoming consultant to the president a year ago. Completion of the lab marks the most recent step in J&L's continuing post-war expansion and improvement program which by the end of 1955 will have cost over $500,000,000. Earlier this year, the firm announced a research development of importance to the steel industry—the laboratory-scale pilot plant at the Ore Research Laboratory at Negaunee, Michigan. This plant successfully up-graded non-magnetic taconite ore, containing about 35 percent iron, to a usable concentrate containing as much as 66 percent iron by means of a reduction-magnetic separation process. (See MINING WORLD, May 1955, page 87.) The new Graham lab will have the most modern equipment for physical testing, metallographic studies, X-ray diffraction, spectrographic analysis, and analytical chemistry. The building will also house the administrative activities of the Research Division; a 3,500-volume library; accounting and purchasing offices; and a fully equipped machine shop.

during the year pressure on the mines increased to the point where all properties were producing at or near capacity. Where in 1954 many plants shut down during September, this year all plants operated as long as the weather would permit.

Oliver Iron Mining Division of *U. S. Steel Corporation* puts its first HMS and cyclone plant into operation at the *Gross Marble* mine early in October. The plant handles approximately 320 long tons per hour of 1¼-inch by ¾-inch ore in a two-section HMS plant and 180 long tons per hour of minus ¾-inch, plus-48-mesh ore in a two-section cyclone plant. Oliver is presently planning a similar plant for its *Trout Lake* operations.

The *Biwabik Mining Company, Pickands Mather & Company*, operating agents, has announced that the *Biwabik* mine will be closed at the end of the 1955 shipping season due to exhaustion of available ore tonnage. The Biwabik mine was opened in 1903 by the *Cass Mining Company*. Plans are to transfer most employees to the *Erie* mine near Aurora.

Pickands Mather & Co. is tentatively planning on the construction of a new beneficiation plant at the *Rabbit Lake* mine on the Cuyuna Range. Plans call for moving the heavy media mobil mill and auxiliary equipment located at the *Biwabik* mine to Rabbit Lake. This will be the second beneficiation plant on the Cuyuna for Pickands Mather. A plant at the *Mahnomen* mine was put in production earlier this year.

Oliver Iron Mining Division of *U. S. Steel Corporation* is planning a number of major changes in crushing and screening plants on the Iron Range this winter. Additional facilities will be installed so all fines can be shipped separate from the coarse ore. This step will eliminate the necessity of screening at lower lake ports and the fines will be shipped directly to sintering plants.

Before the end of the mining season this year, the new 22,000-kw Presque Isle steam turbine electric generating station went into full operation at Marquette, Michigan. The station was built jointly by *The Cleveland-Cliffs Iron Company* and the *Upper Peninsula Power Company* on a 50-50 basis. It is part of an over-all plan to bring more power to the copper and iron mining areas of the Keweenaw Peninsula and the Marquette iron range.

The *W. S. Moore Company* has canceled plans for the construction of a new beneficiation plant at the *O'Brien* mine this winter. Work is now scheduled to start in the spring of 1956 with the plant ready for the 1957 season. The proposed plant will include washing, HMS, and Remer jigs.

The Sentinals of Safety trophy, highest award in nation-wide mining safety competition, was presented to the *Mahoning* open-pit mine, operated by *Pickands Mather & Co.* again this year. The presentation was made by Felix A. Wormser, Assistant Secretary of the Interior.

Oliver Iron Mining Division of the *U. S. Steel Corporation* has announced plans to begin mining its last major high-grade iron ore reserve in the Virginia area, Minnesota, starting next season. The Sauntry reserve is estimated to contain 30,000,000 tons of ore. Arrangements are being made to reroute roads now crossing the reserve so stripping operations can begin within the next few months.

The *Newport* and *Anvil* mines on the Gogebic range reportedly will be taken over by the new *Mauthe Mining Company* from the *Youngstown Mines Corporation*. *Pickands Mather & Co.* will continue as operating agents for the new owners, however. Also transferred to the new company are the *West-Davis* and *Geneva* mines at Ironwood by Oliver Mining Division of U. S. *Steel Corporation*. The close proximity of the Davis-Geneva mine shafts and the workings of the Newport mine would permit combining operations of the two. The present Geneva and West-Davis mines are combinations of the following: the Davis, formerly known as the *New Davis* or *Wisconsin*, opened in 1890; the Geneva mines which began operations in 1903 as the *Lisbon* mine; and the West-Davis, formerly called the *North Newport*, opened in 1915.

The *Duluth Iron and Metal Company* has completed dismantling of the headframe and other surface structures of the old *Blueberry* mine west of Ishpeming, Michigan. The Blueberry was opened in 1926 by the *Ford Motor Company*, and later operated by the *North Range Mining Company* of Negaunee. Active mining operations were concluded earlier this year when the orebody was depleted. The mine had been opened to a depth of 1,650 feet and was worked by the top slicing and stoping method.

Central Farmers Plan P_2O_5 Mine and Furnace

Central Farmers Fertilizer Company (CFFC) will develop a phosphate mine and construct a phosphate processing plant on its property near Georgetown Canyon, Bear Lake County, Idaho. Total cost of the project is estimated at $7,500,000.

When weather permits next spring, a railroad spur will be built to connect the plant site with the mainline of the Union Pacific Railroad west of Georgetown. Work will also start then on construction of the ore processing facilities, including a grinding and calcining plant to prepare the rock phosphate for shipment to fertilizer acidulating plants. This same equipment will also be used later in preparing the phosphate to suitable form as a furnace charge for the 35,000-kw electric furnace planned for construction in 1957.

Utah Power and Light Company will supply electric energy for the furnace under a recent agreement. The furnace will extract elemental phosphorus from the ores, and will then be converted into a highly concentrated fertilizer material. Initial production will be about 100,000 tons annually of this product.

The company owns 2,375 acres of phosphate land in Georgetown Canyon. The ore will be mined by open pit, although two adits were driven earlier as part of exploratory work at the mine. These adits will be maintained in standby conditions for possible use if underground mining is needed to supplement surface mining.

New Rainbow Mining Company has made considerable progress toward developing an operating mine since it started to reopen the old *Weber* mine near Lakeview, Bonner County, Idaho, two years ago. More than 800 tons of ore has been extracted from a raise. Two carloads of direct shipping ore averaged 21.72 ounces of silver and 0.055 of an ounce of gold per ton. Seven hundred tons of milling grade ore are being treated at the nearby *Idaho Lakeview Mining Company* flotation plant. Robert B. Austin of Wallace is president and manager.

The "Ike" vein (formerly the "Truman" vein) has been intersected on the new 27 level of the *Bunker Hill* mine at Kellogg, Shoshone County, Idaho, and found to contain lead-silver-zinc ore. The level is the deepest in the Coeur d'Alene mining region—1,200 feet below sea level. At the firm's silver-copper *Crescent* mine several miles to the east, No. 4 ore shoot on the new 3,110-foot level has proved to be about 400 feet long. Stanley McDougall is mines manager for *Bunker Hill & Sullivan Mining and Concentrating Company.*

The *J. R. Simplot Company's* department of mining exploration and development was able to complete diamond drilling on the barite property near Hailey, Idaho before the winter season set in. A small amount of ore was also mined this year, and plans for next season include mining of about 40,000 tons.

A DMEA contract valued at $328,290 was granted to *Idaho Metallurgical Industries* to explore for cobalt and copper in Lemhi County, Idaho. The government's share of the contract will total $205,180.

A 3,000-pound test shipment of uranium-bearing ore has been made from the *Lucky Win* claims near the mouth of John's Creek, Ten Mile mining district, near Grangeville, Idaho. Frank Irwin is doing the exploration work for owners Walter S. Campbell and Winifred Campbell of Lapwai.

A milling plant with 15 tons daily capacity has been installed to treat oxidized lead-silver ore at the property of *Idaho Goldfields, Inc.*, in Fourth of July Canyon east of Coeur d'Alene, Kootenai County, Idaho. A six-man bunkhouse has been built in anticipation of winter operations. L. A. Thompson, Spokane, is president.

The *Springfield* tungsten mine near Stibnite, Valley County, Idaho is yielding 170 tons of ore daily. The mill recently started handling ore from an open-pit operation after treating talus material for several years. Scheelite concentrates are trucked to Stibnite for roasting and magnetic separation. Forty-five men are employed at the *Bradley Mining Co. operation.*

At *Bradley Mining Co.'s Ima* tungsten mine, 70 miles south of Salmon Lemhi County, Idaho, about 100 men are mining and drilling 200 tons of hubnerite tungsten ore daily. A new secondary crusher was recently installed at the mill.

The old *Empire* copper mine in Custer County, Idaho has been rehabilitated by *Idaho Alta Metals Corporation* of New York. Plans include installation of modern mining equipment, driving of a 1,100-foot adit to gain depth and construction of a concentrator when ore reserves merit. E. G. Bowen, executive vice president, is directing work.

On Upper Trail Creek in Idaho, Clayton Stewart has staked claims after finding three molybdenum veins in granite.

Two firms have halted monazite dredging operations at Cascade, Idaho after five years' operations because of lack of a market for their product. Officials hoped the closures would be only temporary. The firms were *Idaho-Canadian Dredging Company* and *Baumhoff-Marshall, Inc.* They reportedly were considering a merger and construction of a chemical plant and a slagging plant to recover other minerals.

The Idaho Bureau of Mines and Geology has published a pamphlet describing successful experiments in concentrating lead in oxidized ores. Assistant Director Lewis S. Prater found that addition of reagents in stages is the key to most complete recovery of lead carbonate.

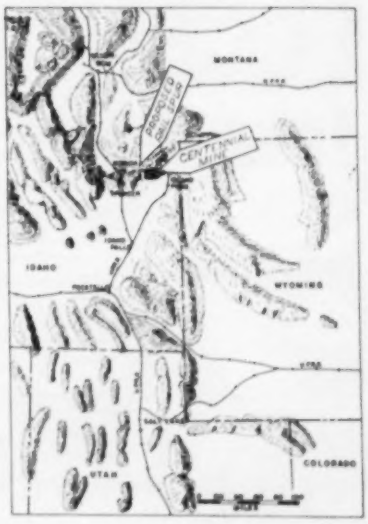
Idaho Thorium Co., Inc. of Salmon, Idaho has been incorporated by J. H. Stocks and Clinton A. Gunderson of Mackay, A. L. Stocks of Preston, and P. W. Frank of Pocatello. It is capitalized for $300,000.

The *Geochem Development Company* plans to do some development and sampling work on the *Jo Dandy* group of claims near Radersburg, Montana. Plans are being made to dewater the shaft for inspection and sampling of the lower workings.

John White of Missoula, Montana, and associates are planning to develop the old *Golden Girl-Sunlight* mine near Whitehall. This mine was an early day gold producer. Some promising ore has been exposed in open cut operations and the construction of a cyanide mill. has been started. The ore is to be mined by open pit methods, but the ore will be

Simplot To Open Centennial Mine in July 1956

The J. R. Simplot Company of Boise, the largest producer of phosphate rock in Idaho, is planning to open a new mine in northern Idaho. First shipment from the Centennial mine is scheduled before July 1, 1956. The 3,600-acre mine site is shown on the accompanying map, as is also the route of the proposed new railroad spur to reach the property. All ore from 1956 operations, between 100,000 and 150,000 tons, will be trucked to the loading station at Monida, Montana for shipment to British Columbia for conversion to fertilizer. Simplot's geology and mining exploration departments have been prospecting the area since 1950. The deposit, which bisects the Idaho-Montana state boundary, is located in Clark County, Idaho, and Beaverhead County, Montana. Geologically the new mine is similar to other Idaho phosphate mines with ore occurring in the Phosperia formation. Initial mining will be by open pitting while underground development is carried on for large-scale production. Reserves of phosphate are large and the Centennial will become one of the largest underground phosphate mines in the west. Simplot's largest phophate mine today is at Gay, Idaho on Fort Hall Indian Reservation.



transferred from the pit floor through an old raise to a haulage level below for transportation to the mill.

The *Western American Uranium Corporation* is doing some exploratory work for uranium minerals at the *Red Rock* group of uranium claims located three miles west of Basin, Montana on Highway 91. The uranium vein occurs in andesite at Red Rock.

Moab Treasure Uranium Inc. of Salt Lake City, Utah is sinking an incline shaft on the *Free Enterprise* claims No. 2 and 3, located about 2½ miles west of Boulder, Montana.

George Hoffman of Helena, Montana, owner of the *White Pine* uranium mine located in the Warm Springs area of Jefferson County, plans to do some development work on a primary uranium vein occurring in the mine.

David Nieminen and Ed Mackay plan to extend an adit an additional 50 to 100 feet on the *May Day* group of claims located approximately two miles of Boulder, Montana.

New Montana mining firms: *McCulloch-Childers, Inc.*, Missoula, incorporated by Joseph W. McCulloch, Okmulgie, Oklahoma, and O. M. Childers and Wayne J. Hiett, both Missoula; *State Oil & Uranium Corporation*, by Tom Snyder, William Selvidge and James W. Cole, all of Billings; *M. and M. Development Company*, $30,000 capitalization, by Bernard Barnes and George M. Rankin, Marmouth, North Dakota, and Gene Huntley, Baker; *Balatoc Uranium and Mining Company*, Missoula, $50,000, by M. R. Wood, Kalispell; J. E. Hopkins, Helena, and Lyle Denniston, Missoula; *Uranium Corporation of America*, Boulder, by Donald B. Hoiekvam, Boulder, and James M. Goodpaster and William B. Murray, Portland; *Montana Mining and Milling Company*, Helena, Jean M. Hilman, secretary, and E. K. Cheadle, Billings, resident agent.

Ralph E. Krause of White Sulphur Springs, Montana; Robert E. Hardgrove of Livingston; and T. W. Jones of Billings have incorporated *Thomas Creek Mining Company* with capital stock of $50,000.

Owners Operating Company of Helena, Montana is planning to resume work next spring at the *Lincoln Placers Company* property near Lincoln, using heavier equipment and a larger washing plant. A ¾-yard dragline was used in a five-week testing operation late this season. Roy S. Smith, Spokane, Washington, is president of the operating company, incorporated in August with $50,000 capitalization. Lyle Wick, Spokane, is vice president, and J. W. Riley, Millwood, Washington, secretary-treasurer. William Long, Helena, was one of the incorporators.

The *Harvey Machine Company* of Torrance, California has completed an agreement with the U. S. Department of the Interior and the Bonneville Power Administration for a transmission line and power facilities to service their proposed new $65,000,000 aluminum reduction plant at The Dalles, Oregon. The company is now ready to begin construction of the plant.

Aluminum Laboratories Ltd., a Canadian firm, is exploring for bauxite in the Salem Hills of Marion County, Oregon. Four drill rigs are being operated by the *Salem Sand and Gravel Company* under the supervision of Aluminum Laboratories' chief geologist, H. R. Hose. Samples are being tested at the company's labs in Arvida, Canada.

The soda deposits of Alkali Lake in eastern Lake County, Oregon are being mined by A. M. Matlock of Eugene, who leased the property on a ten-year basis from the *Favell-Utley Realty Company*. The deposits are concentrated in "potholes" ranging in size from a few inches deep and a few feet wide to several feet deep and 20 to 30 feet wide. The bulk of the crystalline material is the mineral natron, a hydrous sodium carbonate. Mr. Matlock has mined about 100 tons without any unusual difficulty.

In the John Day area of Oregon, two chromite deposits are being developed. One is being mined by Al Dunn of Canyon City at a new discovery on the William Gardner Ranch, and the other by Vernal Ulman of Pilot Rock on a claim owned by Ronald Beggs in the Pine Creek area. Shipments of concentrates have been made from ore milled from both properties. *Tri-County Mining and Concentrating Company Inc.*, operated by J. A. Curzon, is doing the custom milling.

Art Newman of the *John Day Mining Company* is constructing a new mill which will treat chrome ore developed by the company earlier this year at the old *Ward* mine near the head of Little Dog Creek.

In Josephine County, Oregon, William Robertson is extending a winze to open extensive chromite body explored by diamond drilling at the *Oregon Chrome* mine; M. J. McShane, M. E. Adams and Steve McShane resumed production at the *Sad Sack* mine after sinking a 30-foot winze and drifting 80 feet. R. W. Radcliffe and Albert Lea cut two feet of high-grade chromite in a new tunnel 25 feet below open-pit workings; Jack Wilson is opening by bulldozer milling-grade chromite zones at the *Buster* and *Violet* mines and hauling ore to the Bowers chrome mill on Galice Creek.

B. E. and R. L. Jordan of Vale, Oregon are exploring a cinnabar prospect on Hope Butte near Bully Creek where work to date has revealed cinnabar disseminated in a thick, partially opalized acidic tuff which has been intruded by basic dikes. Further tunneling is expected to determine the commercial extent of the deposit.

New Morning Glory Mining Company has been organized by John H. Stevenson Engineers, Inc., of Seattle, Washington

to resume operations at the old *Morning Glory Mining Company* property in the Sylvanite mining district, Lincoln County, Montana. The Seattle engineering firm has paid off obligations of the old firm and is supplying operating funds. Diamond drilling below No. 4 level reportedly has indicated an ore body 52 feet wide and 135 feet long, containing an estimated 240,000 tons of gold-silver-lead ore. It is planned to drive a drift this winter to open this ore on a new No. 6 level. Stevenson is president of New Morning Glory; A. A. Fagnant, Seattle, secretary-treasurer; Raymond C. Smith, Seattle, engineer.

American Zinc, Lead and Smelting Company is studying feasibility of upping production 25 percent at the *Grandview* mine and mill, Pend Oreille County, Washington, early in 1956. Deeper levels of the mine are scheduled to be brought into production at that time. Current production is at 800 tons daily capacity. There are 62 employees. Howard I. Young, St. Louis, president, visited the property recently. The mine is leased from *Grandview Mines*, Spokane.

North Star Uranium, Inc. of Spokane, Washington, has been incorporated to explore leases held by A. E. and R. C. McKelvie on the west slope of Mount Spokane. Capitalization was listed at $350,000 and incorporators as John F. Campbell, Dorothy A. Jerick, and Sam W. Farber, all of Spokane.

A 25-ton tungsten mill is being constructed by R. J. Weller, Spokane excavating contractor, at holdings of *Addy Mining Company*, west of Addy, Stevens County, Washington. Mr. Weller is company president. The mine is operated under lease and purchase option by Frank Birch of Kellogg, Idaho and George Monroe of Butte, Montana. They have been developing an 18-inch-wide vein of ferberite and scheelite discovered by the company in 1952 in underground exploration.

Target Uranium Company has uncovered autunite crystals in bulldozing a fault zone on leased ground in the Mount Spokane district, Spokane County, Washington. Peter W. Mourer, Jr., engineer, has recommended diamond drilling. The lease was obtained from *Uranium Associates, Inc.* of Spokane. The company also holds the *Ruby-Karen* group of 45 unpatented claims in Utah's Monticello district. A public stock offering was made recently. Orlan L. Cline, Spokane is president; Charles H. Stolz, Spokane, secretary.

Ace Enterprise has staked 32 mining claims around a copper discovery in the Colville National Forest about six miles west of Northport, Stevens County, Washington. Surveying and some trenching has been done. An access road was being bulldozed at last report. Associates in the venture are D. T. Papineau, J. L. Canwell, Bob Ashbury, and Walter Baxter of Spokane; J. A. Ledford, Spokane Bridge; John Colby, Ray Wiley, Ida and Bill Heritage, and Glen, Freeman, and F. H. Mike Phillips, all of Northport.

Copper concentrates are being shipped weekly to the Tacoma smelter from the *Bonanza* mill near Colville, Stevens County, Washington. The ore is mined by Earle B. Gibbs, the mill owner, from properties of *Chewelah Copper Company* under a profit-sharing arrangement. Carl Hahn of Yakima is company president; Philip Skok, Chewelah, secretary-treasurer.

Robert Alameda of Salinas, California at last report was diamond-drilling two strong veins at the *Chief Joseph* mine in the Northport mining district, Stevens County, Washington. Zinc, lead, and copper are the principal values.

Bulldozing exploration of two radioactive areas in the Mount Spokane uranium district, Spokane County, Washington, is planned by *Lead Trust Mines, Inc.* Eventual drilling is planned at two company leases in southwestern Stevens County where autunite has been found in granite. F. J. Cardinal, Spokane, is president.

Day Mines, Inc. of Wallace, Idaho is currently terminating its *N. and S.* uranium lease in Ferry County, Washington. Close investigation of the amount and nature of the radioactive mineralization did not live up to expectations based upon the preliminary reconnaissance: Day Mines is continuing to examine uranium properties elsewhere.

The Spokane County engineer's office has declared "war" on "eager-beaver" uranium prospectors who have been hacking holes in county roads and blasting rock from roadside claims and leaving the rock on the roads.

Silver Dollar Mining Company is developing a shear zone autunite discovery near South Skookum lake, Pend Oreille County, Washington. Surface stripping was to be followed by diamond drilling. The company has 21 mining claims surrounding the discovery. Elmer S. Johnston, Spokane, is president of the company, which derives its revenue from northern Idaho's Coeur d'Alene mining district.

Inland Uranium Company of Spokane has filed on a total of 16 mining claims in the Orient mining district, Stevens County, Washington. G. Richard Burch is president.

Sunburst Uranium Associates of Spokane, Washington, has recorded four mining claims in the Kalispell Peak mining district of Stevens County, near the Pend Oreille County line. A. C. Townsend filed for the firm.

Greenbluff Uranium Co., Inc., Rockford, Washington, has been organized by seven prospecting partners to develop a discovery of autunite in the Mount Spokane uranium district. The firm has 4,500 acres under lease in Spokane and Stevens counties. Incorporators were P. J. Koch, Lyman L. Holsten and Robert Gohlman, Rockford; William Bailey, Worley, Idaho; Lewis P. Horyza, Spokane, and David M. Cohn and Lawrence Grunewald, Tekoa.

National Uranium Corporation, Wallace, Idaho, has leased 320 acres seven miles north of the *Daybreak* uranium mine in the Mount Spokane district, Washington. Showings of autunite mineralization in granite have been disclosed by initial work.

Rayrock Uranium Company has been incorporated by Wayne Franks, Carl S. Larson, and Dean McDougall, all of Spokane, Washington, to develop lands in the Mount Spokane district and elsewhere. The firm was capitalized at $400,000.

Census Report Reveals Potash Industry Growth

The 1954 production of potassium salts represented a sixfold increase since 1939, according to preliminary figures released by the United States Department of Commerce. The results of the 1954 Census of Mineral Industries, the first conducted since 1939, are to be published in a series of preliminary and advance reports, final bulletins, and bound volumes by the Bureau of Census.

The first group of reports, which included potash, was issued in November. Statistics for other industries will follow in December. A condensed table of 1954 figures highlighting New Mexico potash production follows:

NEW MEXICO POTASH INDUSTRY IN 1954

Production crude salts (tons)	9,975,000
K_2O equivalent (tons)	1,986,000
Value of shipments	$64,746,000
Number of employees	3,439
Labor (number)*	2,787
Other employees (number)	652
Man hours of labor*	5,429,000
Principal expenses, total	$32,411,000
Wages of labor	$14,626,000
Salaries	$4,998,000
Supplies and minerals received for preparation	$9,631,000
Contract work	$1,046,000
Fuel	$1,118,000
Purchased electric energy	$992,000
Purchased machinery installed	$5,238,000
Capital expenditures	$5,056,000
Horsepower rating of power equipment	84,000

*Labor includes all production and development workers

Guadalupe Mercury Lease Sold to Palo Alto Mining

The Palo Alto Mining Corporation of Campbell, California has purchased the W. L. Mackinnon interest in the famous Guadalupe mine lease near Los Gatos. Mr. Mackinnon had operated the property under lease from the original owners for a number of years. It was one of four California mercury producers during 1954 and 1955, according to U.S. Bureau of Mines reports.

George E. Carlson, general manager of Palo Alto Mining, and Stephen S. Ridgely, Sr., vice president, conducted a series of tests on material from the Kelly Ridge, the Smoke Pit, the Magurke, and the Greenhouse—all mining areas on the Guadalupe property—to determine the economic and metallurgical possibilities of beneficiating the tailings piles and the large quantity of low-grade ore available above ground. While these tests are not yet conclusive, they were of sufficient interest to influence the firm to exercise the option it held.

High-Grade Ore Revealed At Bretz Mercury Mine

Ore bodies showing an average of 22 pounds of mercury to the ton have been disclosed at the Bretz Mercury Mine of York. The property, located just oevr the Oregon border from McDermitt, Nevada, was a rich mercury producer during the 1930's when it was operated by the Bradley Mining Co. of San Francisco, California. The claims were relocated in recent years and leased to the United States Mercury Corporation. Last May U.S. Mercury traded all its assets for stock in the rapidly expanding Shawano Development Corporation.

A Defense Minerals Exploration Administration contract for 4,000 feet of drilling at 75 percent government expense has been awarded the company. Consulting engineer Jay A. Carpenter has examined the ore bodies drilled by Mr. Hart and submitted his report to the firm's mine manager, Louis Avant, of Santa Fe, New Mexico. If Mr. Avant's recommendation is favorable, it is believed that Shawano will build a mercury recovery plant at the mine. President of the corporation, which has extensive phosphate, uranium, and oil interests, is Alexander L. Guterma.

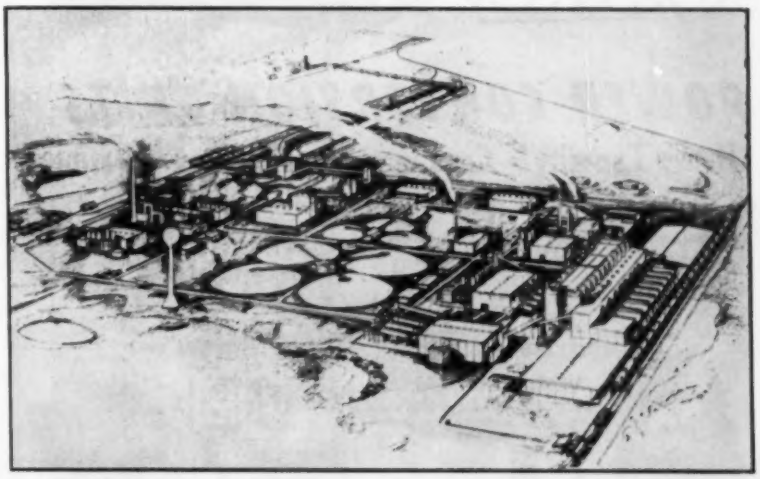
Development work is proceeding as rapidly as possible at the *Christmas* mine of *Inspiration Consolidated Copper Company* near Winkelman, Arizona. Sinking of the shaft toward the O'Carroll horizon has been slowed by soft ground, but firmer rock now permits the installation of mechanical equipment which will speed sinking operations. A tunnel is being driven toward the separate higher grade showing of primary mineralization when completed, it will allow for underground drilling and other work necessary to determine whether an ore deposit is indicated at this location. Rehabilitation and reconstruction of Inspiration's concentrator is also progressing on schedule. The company has received government approval for rapid amortization of 75 percent of the capital cost of the concentrator over a 60-month period after its completion.

Test runs are still being made on the crushing plant at the *San Manuel Copper Corporation's* new mill at San Manuel, Arizona. Ore is being brought in daily from stockpiles at the mine. The new mill and smelter are expected to go into full production around the first of next year.

Four Corners Uranium Corporation of Denver, Colorado reportedly has leased 2,500 acres of land in eastern Arizona and western New Mexico for minerals exploration. The mineral rights were leased from Phil Tovrea Jr. of Phoenix and other ranchers associated in Tovrea Land and Cattle Company. Work will start first in the Tovrea White Signal mining district near Silver City, New Mexico.

The Office of Defense Mobilization granted rapid tax-write-off permits to two Arizona mining firms recently. *Pima Mining Company* received a permit to write-off 75 percent of $8,873,000 for copper mining and concentrating facilities in Pima County; while *Rare Metals Corporation of America* received permission for a write-off of 80 percent of $2,354,276 for uranium ore processing facilities at Tuba City.

Funds from the *U.S. Atomic Energy Commission* will be used to construct nearly 25 miles of access roads into northern Gila County uranium mining



$18,000,000 Expansion for Pacific Coast Borax

Pacific Coast Borax Company, a division of Borax Consolidated, Ltd. of London, will undertake an $18,000,000 expansion program, including a change from underground to open-pit mining at its property in Boron, California. The change to open-pit mining will enable the company to recover virtually all of the deposit at Boron. A joint venture contract has been awarded to two Los Angeles firms—Southwestern Engineering Company and Ford J. Twaits Company—for the engineering and construction of new concentrating and refining plants to handle the variety of ores to be recovered in open-pit operations. The new buildings, shown in the artist's conception above, will be located in Section 23, west of the Jennifer shaft. The new plants are expected to have productive capacity in excess of the company's existing plants at Wilmington, California, and are scheduled for operation by the middle of 1957. James M. Gerstley is president of Pacific Borax.

properties in Arizona. Part of the arrangement provides that Gila County will maintain the roads after they are built. About 18 miles of access road will be constructed into the Cherry Creek area, and an additional 6.5 miles into the Bull Canyon-Deep Creek area. These will be low standard roads about 12 feet wide. Lack of access roads into this part of Gila County has hindered any serious exploration or development work in the past.

Results of the Mineral Resources Survey made by the University of Arizona are now available in four separate volumes. The work was done under a contract with the Bureau of Indian Affairs which provided that the University undertake a survey of mineral resources on the Navajo and Hopi Reservations. The general geology of the Navajo country along with a detailed description of the metalliferous and mineral fuel deposits of the region are included in Volume I. The nonmetallic deposits, the largest number of mineral resources in the area, are covered in Volume II. The construction material deposits are in Volume III, and the fourth volume constitutes a supplemental study on the Pinyon Pine resources. Copies are available from the Assistant Superintendent (Resources), U.S. Bureau of Indian Affairs, Navajo Agency, Window Rock, Arizona.

The *Esperanza Corporation* of Salt Lake City is employing a crew of seven men at the *Esperanza* mine in the Cedar mining district, near Kingman, Arizona. According to A. H. Ellett, vice-president, the company is making plans for a 300- to 400-ton-capacity custom mill in the near future. Associated with Mr. Ellett is D. C. DeGraff, business manager.

The Port Commission at Stockton, California awarded a $72,722 contract to Shepherd and Green, as highest bidder, to prepare the Port's new bulk ore loading facility for installation of a rotary car dumper that will unload cars at the rate of 750 tons an hour. Work on a concrete abutment has started and a new hopper is being designed by Keiser engineers to provide a 41½° slope. The dumper was purchased in Garrison, North Dakota and has been delivered. The installation reportedly will be the only one of its kind on the Pacific Coast. The new dumper will speed iron ore shipments from Nevada to Japan.

Idaho-Maryland Mines Corporation is building a tungsten mill at its mine in Grass Valley, California, with completion scheduled for the first of next year. The company has been operating a pilot plant for tungsten ore during the past year. It is mining tungsten from the 900-foot level of its gold mine and plans to extend mining operations down to the 1,100-foot level.

The *H. W. Gould Company* of San Francisco has taken over the *Defense* mine 15 miles southwest of Panamint Springs, Inyo County, California. The former operators were Foreman and Foreman of Salt Lake City, Utah. Terms of the transaction were not disclosed. The Defense mine has, for the past seven years, been a consistent producer of high-grade lead-silver ore. Shipments to the Selby smelter of *American Smelting and Refining Company* have been resumed under the new management and a monthly production of 200 to 300 tons is contemplated.

Consolidated Uranium Mines, Inc. has taken over the *Lindsay* scheelite mine 28 miles east of Mina, Nevada. The company plans a diamond drilling program at the Lindsay and also on the *Garnet* tungsten claims in the same area.

The *Vincoze Brothers* have developed an open-pit tungsten mine west of Lovelock, Nevada and have already stockpiled 3,000 tons of 0.7 percent ore. This ore will be trucked to the Toulon mill of the *Wolfram Company*. The three claims were located in January 1955 and a bulldozer began immediately to strip overburden. The plan now is to ship 100 tons a day to the Toulon mill. An estimated 120,000 tons of ore is reportedly in sight.

Moab Mines, Inc. is currently stockpiling mercury ore at the company's *Black Crow* mine in Mineral County, Nevada. Operations are being conducted in the 50-foot incline tunnel. Roadwork is being completed on the property. Ore will be shipped to Red Hill mill in Bishop, California, approximately 50 miles from the mine.

The *Old English Gold Corporation* of Provo, Utah reports discovery of uranium ore in Troy Canyon, Nye County, Nevada. The company plans immediate production. A crosscut adit 500 feet below the outcrop has cut the vein. A drift will be driven on the vein to a point below the surface showings in an attempt to find higher grade mineralization. A 50-ton mill is installed on the property and a large Diesel generator supplies needed power.

Don Bielenberg and associates are developing an open-pit uranium operation on the *Mustang* group of claims in Cottonwood Canyon, Nevada. A nine-foot vein reportedly has been exposed by bulldozing.

The *H. W. Gould Company* of San Francisco, California is operating the *Tamney* tungsten mine at Yucca Flat, Nevada. Through the past summer, shipments were made to a custom mill and are expected to resume following the present development program.

NEW MEXICO

The *New Mexico Consolidated Mining Company*, a subsidiary of *Peru Mining Company*, has resumed operations at its *Kearney* mine in Grant County, New Mexico after a two-year shutdown. This is a lead-zinc property which was closed down in 1953 because of low base metal prices.

Western Mines, Inc., wholly owned subsidiary of *Western Development Company* of Santa Fe, New Mexico, has begun deliveries of lead-zinc ore from its properties near Cerrillos. The first 50-ton shipment was sent to the *American Smelting and Refining Company* smelter at Deming.

Petaca Mining Company started production at its mica mill in Rio Arriba County, New Mexico, after dedication ceremonies October 5. The plant will employ about 40 people.

Aztec Copper Company of Espanola, New Mexico has made arrangements to start shipping ore to the *American Smelting and Refining Company* smelter at El Paso, Texas. The mine is on Copper Mountain north of Santa Fe.

Kerr-McGee Oil Industries' Navajo Uranium Division plans an immediate expansion of its new uranium mill at Shiprock, New Mexico. Capacity will be increased 25 percent by the new additions.

Southwest Potash Corporation in the Carlsbad district, New Mexico, subsidiary of *American Metals, Ltd.*, has announced plans for a $2,500,000 modification and expansion program. The mine and refinery, which have been operating for three years, were designed for 3,000 tons per day ore capacity. This will be increased to 4,000 tons per day.

U.S.A. Metal & Mineral Prices

METALS

		November 18, 1955
COPPER:	**Electrolytic.** Delivered **F.o.b. cars,** Valley basis	43.00¢
	Lake. Delivered, destinations, U.S.A.	43.00¢
	Foreign Copper. Valley basis	43.00¢
LEAD:	**Common Grade.** New York	15.50¢
ZINC:	**Tri-State Concentrates,** jig, flotation 80% lead, per ton	$195.05
	Prime Western; F.o.b. E. St. Louis	13.00¢
	Prime Western; Delivered, New York	13.50¢
	Tri-State Concentrate, 60% zinc, per ton	$84.00
ALUMINUM:	**Primary 30 Pound Ingots (99% plus).** F.o.b. shipping points	24.40¢
ANTIMONY:	**Lone Star Brand.** F.o.b. Laredo, in bulk	33.50¢
BISMUTH:	(In ton lots) price per pound	$2.25
CADMIUM	**Sticks and bars,** 1 to 5 ton lots (Price per pound)	$1.70
COBALT:	**97-99%,** keg of 550 pounds (Price per pound)	$2.60
COLUMBIUM:	**Powder** Nom., per pound	$119.25
LITHIUM:	98% (per pound)	$10.00-$13.00
MAGNESIUM:	**Ingots (99.8%)** F.o.b. Velasco, Texas, per pound	33.70¢
MERCURY:	**Flasks.** Small lots, New York	$278.00-$283.00
NICKEL:	**"J" Ingots (5 pounds).** F.o.b. refinery, Port Colbourne, Ontario	64.50¢
TIN:	**Grade A. Brands.** New York (Price per pound) Prompt delivery	96.875¢
TITANIUM:	**99.3% + Grade "A"** (Price per pound)	$3.75
GOLD:	**United States Treasury Price**	$35.00 per ounce
SILVER:	**Newly mined domestic.** United States Treasury price	90.50¢ per ounce
	Foreign Handy Harmon	91⅝¢
PLATINUM:	**Per Ounce**	$97.00-$99.00
ZIRCONIUM:	**Sponge, Per Pound**	$10.00

ORES AND CONCENTRATES

BERYLLIUM ORE:	**10 to 12% BeO. F.o.b. mine, Colorado**	$47.00 per unit
	Small lot purchases at Custer, S. D., Spruce Pine, N. C., and Franklin, N. H. Visual inspection at $400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, $40 per unit; 9.0 to 9.9%, $45; over 10.0%, $50.	
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesian). 48% Cr_2O_3. 3 to 1 Ratio	$44.00-$45.00
	African (Transvaal). 48% Cr_2O_3. No Ratio	$31.00-$32.00
	Turkish, 48% Cr_2O_3, 3 to 1 chrome-iron ratio	$48.00
	U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, $115.00; fines and concentrates $110.00 for 48% Cr_2O_3 and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr_2O_3.	
COLUMBIUM-TANTALUM ORE:	At United States small lot beryl purchase depots. $3.40 per pound contained combined pentoxides in 50% ore. Includes 100% bonus. (Government stopped buying temporarily May 12)	
IRON ORE:	Lake Superior, Per gross ton Lower Lake Ports	
	Mesabi, Non Bessemer, 51.5% Fe. Second quarter	$10.10
	Mesabi, Bessemer, 51.5% Fe. Second quarter	$10.25
	Old Range Non Bessemer. Second quarter	$10.25
	Old Range Bessemer. Second quarter	$10.40
MANGANESE ORE:	**Swedish,** Atlantic Ports, 60 to 68% Fe. Contracts, Per Unit	22.00¢
	Metallurgical grade. 48 to 50% Mn. Long ton unit	$0.96
	Metallurgical grade. 46 to 48% Mn. Long ton unit	$0.94
	Metallurgical grade. 45 to 46% Mn. Long ton unit	$0.87
	Chemical grade. 80% MnO_2. Per Ton	$70.00
	Domestic U. S. Government are purchasing depots: Deming, New Mexico; base price $2.30 per long dry ton unit of recoverable manganese less handling and treating costs. Butte, Montana; (black and pink ores) base price of $4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana base price of $6.43 per long ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) $2.30 per unit with premiums and penalties.	
MOLYBDENUM CONCENTRATE:	90% MoS_2 F.o.b. Climax, Colorado. Per pound of contained molybdenum, plus cost of containers	$1.05
TUNGSTEN CONCENTRATE:	**Domestic.** 60% WO_3 Per short ton unit	$63.00
	Foreign. 65% WO_3 Per short ton unit (Scheelite)	$35.00
	Foreign. South American, Spanish, Portuguese	$34.00
URANIUM ORE:	**Carnotite-Roscoelite.** F.o.b. purchase depot plus $0.06 per ton mile ($6.00 maximum), Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado Salt Lake City, Marysvale, Thompsons, Moab, White Canyon, Green River, and Monticello, Utah. Shiprock, and Bluewater, New Mexico, Edgemont, S. Dakota, Riverton, Wyoming, and Cutter, Arizona. Base price for 0.10% ore is $1.50 per pound and up to $3.50 per pound of contained U_3O_8 plus $0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of $0.25 per pound for each in excess of 10 pounds. A $0.50 per pound development allowance paid on all ore purchases. At Shiprock all ores with more than 6% lime are penalized for excess lime. At Monticello ores will be paid for in accordance with metallurgical characteristics.	
VANADIUM ORE:	**Carnotite-Roscoelite.** V_2O_5 in ratio of more than 10 parts to 1 part of U_3O_8 are generally acceptable at all AEC depots, but excess not paid for at Marysvale, **Monticello, Shiprock, and Bluewater** Per Pound V_2O_5	$0.31

NON-METALLIC MINERALS

BENTONITE:	**Minus-200-mesh. F.o.b. Wyoming points. Per ton in carload lots**	$12.50
	Oil Well grade. Packed in 100 pound paper bags	$14.00
FLUORSPAR:	**Metallurgical grade.** 70% effective CaF_2 content per short ton F.o.b. Illinois-Kentucky mines	$30.00
	Mexican. 70% **F.o.b. border**	$22.00
	European, Atlantic Ports, 70%	$30.00
	Acid Grade. 97% CaF_2 F.o.b. Kentucky, Illinois, Colorado	$49.00
PERLITE:	**Crude: F.o.b mine per short ton**	$3.00 to $5.00
	Plaster grades. Crushed and sized. **F.o.b. plants**	$7.00 to $9.00
SULPHUR:	Long ton, **F.o.b. Hoskins Mound, Texas**	$25.50
	Export	$30.50

LONDON METAL AND MINERAL PRICES

		November 15, 1955 Per Long Ton		USA Equivalent cents per pound[1]
COPPER:	**Electrolytic spot**	£376	0s Od	47.00¢
LEAD:	**Refined 99.9%**	£107	15s Od	13.47½¢
ZINC:	**Virgin, 98%**	£ 92	5s Od	11.53¢
ALUMINUM:	**Ingot, 99.5%**	£171	0s Od	21.375¢
ANTIMONY:	**Regulus, 99.6%**	£210	0s Od	26.25¢
TIN:	**Standard, 99.75%**	£775	10s Od	96.94¢
TUNGSTEN:	**Long ton unit, 24s**	$34.30 per unit		

1. With Sterling pound at $2.80.

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N. Y.

Personalities

Continued from page 74

J. Frank Sharp, superintendent of operations for Consolidated Coppermines Company, Ely, Nevada, has completed a study of open pit mining practices on the Mesabi Range. He visited the Minnesota area in September. Consolidated is starting an expanded open-pit mining program at its Veteran pit, Kimberly, Nevada.

Arnold Buzzalini, Albuquerque, New Mexico uranium geologist, has been named secretary of the mining branch of the American Institute of Mining and Metallurgical Engineers. He was formerly manager and chief geologist of the uranium division of Pubco Development, Inc. His headquarters are now in New York City.

A. W. Fahrenwald, one of the leading authorities in the field of extractive metallurgy, has been retained as technical consultant by Manganese, Inc. Dr. Fahrenwald, until recently Dean of the School of Mines at the University of Idaho, is developer of the Hydro Classifier and Denver Sub "A" flotation cell.

Callahan Zinc-Lead Company has added three persons to its board of directors. These include **Gordon Dean,** former chairman of the United States Atomic Energy Commission and senior vice president of General Dynamics Corporation; **Joseph H. Hirschhorn,** Algom Uranium Mines Ltd. and Pronto Uranium Mines Ltd. of Canada; **Philip D. Wilson,** Lehman Brothers.

Edwin T. Knight has been named exploration manager of the Rosario Exploration Company, with headquarters in Grand Junction, Colorado.

Frank Daugherty, Alpine, Texas, was named superintendent of Lone Star Mercury mining operations in the Terlingua district. He succeeds Roy Brown, who recently resigned.

Lawrence A. Roe was recently appointed minerals beneficiation engineer by the engineering division of International Minerals & Chemical Corporation, Chicago, Illinois.

Henry F. Adams, concentrator superintendent, has retired from the Inspiration Consolidated Copper Company operations at Globe, Arizona. He was with Inspiration for 36 years.

J. B. Arthur, founder and president of the Mexico Refractories Company, Mexico, Missouri, was presented with a bronze plaque commemorating his leadership in the firm on the occasion

OBITUARIES

W. H. Burgin, 37, district geologist for Bear Creek Mining Company in the Rocky Mountain District, was killed in a plane crash in Wyoming October 6. A graduate of the Missouri School of Mines, Mr. Burgin had been employed by Utah Copper Company until he entered the Air Force in World War II. After the war he was employed by a number of Utah companies until he joined the Kennecott subsidiary.

Burt B. Brewster, 65, editor and publisher of the Mining and Contracting Review, Salt Lake City, Utah, died October 28. A mining engineer, Mr. Brewster had served in the field for 45 years in various parts of the United States and Alaska. In 1934 he entered private consulting work and purchased the magazine which he published and edited until his death.

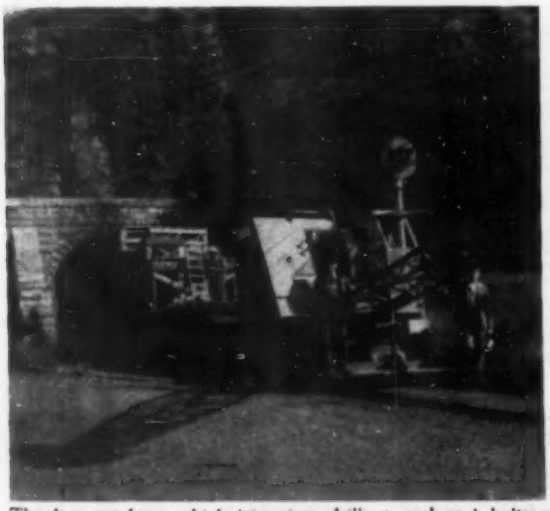
Roof Bolting Holds Slabs In 82-Year-Old Railroad Tunnel

The Illinois Central Railroad's 900-foot tunnel at East Dubuque, Illinois, was driven through limestone in 1872. Many small crevices were in the walls and back of the tunnel. Fumes from coal-burning locomotives going through the tunnel added to the rock's disintegration.

During the summer of 1953 it was decided, therefore, to make the first major repairs in the tunnel's history. Under the direction of M. Block, engineer of bridges, Illinois Central Railroad, and his assistant, E. E. Runde, a detailed geological examination was made by staff members of the Wisconsin Institute of Technology at Platteville, Wisconsin. It was decided to borrow the technique of roof bolting from the mining industry to secure all loose slabs of rock remaining after a thorough trimming of the tunnel.

John Lickes, a Livingston, Wisconsin mining man, with extensive experience with rock conditions in the Wisconsin-Illinois Lead-Zinc District, was engaged to supervise trimming of the tunnel and installing of the roof bolts. Work was done by a four-man Illinois Central bridge crew. Equipment was carried in and out of the tunnel and work was done atop a specially equipped box car pulled by a gas-driven crane.

Holes fifteen-sixteenths of an inch in diameter were drilled with a jackhammer and air-leg mounted on top of the box car. Expansion bolts, of three-fourths inch diameter and varying in length from 3 to 5 feet, were used with ¾-inch thick by 6-inch square steel plates. More than 800 such bolts were installed in the tunnel.



The box car from which trimming, drilling, and roof bolting was done being pushed into the tunnel with a gas-driven crane.

Drilling in operation. Light areas are where trimming has been done, installed bolts can be seen against these areas.

Line Your Underground Air Receiver With Rock-Seal To Prevent Air Loss

Underground compressed air storage chambers have proved successful in Canada and Norway. Tests at some mines in the Rocky Mountains have proved unsuccessful because of air leakage through apparently solid rock.

In Japan, the Mitsui Mining and Smelting Co., Ltd. is now completing the world's largest underground high-pressure compressed air storage receiver in the world. It has a 7,000-cubic-meter capacity with pressure maintained by a high column of water. Further details of this receiver will appear in later issues of MINING WORLD.

A new sealant developed for the natural gas and liquified petroleum industries for sealing the walls of excavated underground storage chambers will interest mine operators contemplating compressed air storage underground.

The West Chester Chemical Company has developed a new compound called Rock-Seal. It has remarkable penetrating and surface coating properties. Under test conditions to pressures of 160 pounds per square inch and periods to several months leakage has proven to be negligible.

The new sealant is a water emulsion of neoprene and a silicone resin.

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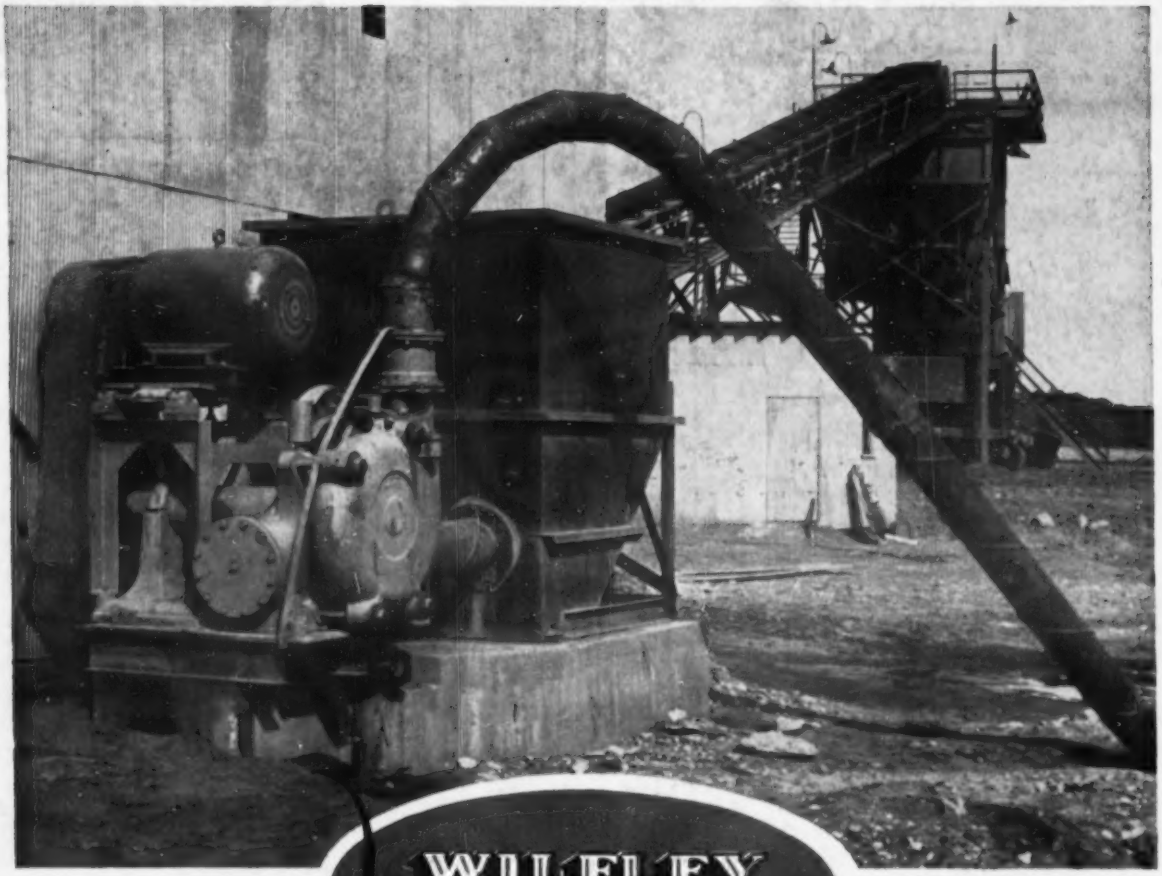

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